Saturday, December 11

09:20~10:05 Dorsett Ballroom 帝盛厅 7F

Room A: 962 9919 4800

Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

Beyond the Moore's Law: Technology Trends and the Challenging

Jianguo Ma

Professor, Fellow of the IEEE, Guangdong University of Technology, China

There two keys for the Moore's Law: Everything is predictable and the fabrication cost per transistor is declining 40% per year as keeping the same performances. Unfortunately, starting from 90nm technology note the cost of making the transistor cannot keep the Moore's Law and even, then the note reached to 28nm technology the cost is at the minimum. Further decreasing the seizes the cost is increasing dramatically, that is so-called the 'End of Moore's Law'. The trends of beyond the Moore's Law are application-driven, accelerated-technology innovations (ATI) will become the key. The new driven-motors will be Automotive chips, Industrial-application specific integrated circuits (IASIC), and the healthcare ICs.

Bio: Jianguo Ma (Fellow, IEEE) received the B.Sc. and M.Sc. degrees from Lanzhou University, Lanzhou, China, in 1982 and 1988, respectively, and the Ph.D. degree in engineering from Duisburg University, Duisburg, Germany, in 1996. He was a Post-Doctoral Fellow with the Technical University of Nova Scotia, Halifax, NS, Canada, from 1996 to 1997. He was a Faculty Member with Nanyang Technological University, Singapore, from 1997 to 2005, where he was also the Founding Director of the Center for Integrated Circuits and Systems. From 2005 to 2009, he was with the University of Electronic Science and Technology of China, Chengdu, China. He has been the Technical Director with the Tianjin IC Design Center since 2008, where he has been the Dean of the School of Electronic Information Engineering, Tianjin University, from 2009 to 2016. He is currently with the School of Computer Science and Technology, Guangdong University of Technology, Guangzhou, China. He has authored or coauthored about 245 technical articles, 6 U.S. patents granted and 15 filed/granted China patents, and 2 books. His current research interests include RFICs and RF integrated systems for wireless, RF device characterization modeling, monolithic microwave integrated circuit (MMIC), RF/microwave circuits and systems, and electromagnetic interference (EMI) in wireless, radio frequency identification (RFID), and wireless sensing networks.,Dr. Ma is currently serving as a member of the Editorial Board for the Proceedings of the IEEE. He served as the Associate Editor for the IEEE Microwave and Components Letters from 2004 to 2005. He was a recipient of the prestigious Changjiang (Yangtze) Scholar Award of the Ministry of Education of China in 2007. He was also a recipient of the Distinguished Young Investigator Award of the National Natural Science Foundation of China in 2006.

Saturday, December 11

10:40~11:25 Dorsett Ballroom 帝盛厅 7F

Room A: 962 9919 4800

Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

Intelligent Fabric Agents in 6G Smart Space

Min Chen

Professor, Fellow of the IEEE, Huazhong University of Science and Technology, China

In 6G network, the realization of a terminal intelligence for cognizing user's need via embedded AI algorithms, to support ultra-low latency, non-intrusive and immersive service experience, is a new challenge compared to the existing 5G technologies. This talk introduces the development of various functional fabrics, which have provided brand-new thoughts for generating valuable "fabric" data interconnected by edge clouds and visualization system to embrace 6G digital intelligent world. In this talk, the smart fabric space empowered by intelligent fabric agents, is presented to deliver multidimensional sensory data and interactive information for enabling various 6G smart space applications in sport, healthcare and medical scenarios.

Bio: Min Chen is a full professor in School of Computer Science and Technology at Huazhong University of Science and Technology (HUST) since Feb. 2012. He is the director of Embedded and Pervasive Computing (EPIC) Lab, and the director of Data Engieering Institute at HUST. He is the founding Chair of IEEE Computer Society (CS) Special Technical Communities (STC) on Big Data. He was an assistant professor in School of Computer Science and Engineering at Seoul National University (SNU). He worked as a Post-Doctoral Fellow in Department of Electrical and Computer Engineering at University of British Columbia (UBC) for three years. Before joining UBC, he was a Post-Doctoral Fellow at SNU for one and half years. He has 300+ publications, including 200+ SCI papers, 100+ IEEE Trans./Journal papers, 34 ESI highly cited papers and 12 ESI hot papers. He has published 12 books, including Cognitive Computing and Deep Learning (2018) with China Machine Press and Big Data Analytics for Cloud/IoT and Cognitive Computing (2017) with Wiley. His Google Scholar Citations reached 28,500+ with an h-index of 82 and i10-index of 250. His top paper was cited 3,200+ times. He was selected as Highly Cited Researcher at 2018, 2019 and 2020. He got IEEE Communications Society Fred W. Ellersick Prize in 2017, and the IEEE Jack Neubauer Memorial Award in 2019. His research focuses on cognitive computing, 5G Networks, wearable computing, big data analytics, robotics, machine learning, deep learning, emotion detection, and mobile edge computing, etc. Min Chen is a Fellow of IEEE.

Saturday, December 11

11:25~12:10 Dorsett Ballroom 帝盛厅 7F

Room A: 962 9919 4800

Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

An Online Learning Approach to Network Application Optimization with Guarantee

John C.S. Lui

Professor, Fellow of ACM, Fellow of IEEE, The Chinese University of Hong Kong, Hong Kong

Network application optimization is essential for improving the performance of the application as well as its user experience. The network application parameters are crucial in making proper decisions for network application optimizations. However, many existing works are impractical by assuming a priori knowledge of the parameters which are usually unknown and need to be estimated. There have been studies that consider optimizing network application in an online learning context using multi-armed bandit models. However, existing frameworks are problematic as they only consider to find the optimal decisions to minimize the regret, but neglect the constraints (or guarantee) requirements which may be excessively violated. In this work, we first propose a novel online learning framework for network application optimizations with guarantee. To the best of our knowledge, we are the first to formulate the stochastic constrained multi-armed bandit model with time-varying "multi- level rewards" by taking both "regret" and "violation" into consideration. We are also the first to design a constrained bandit policy, Learning with Minimum Guarantee (LMG), with provable sub-linear regret and violation bounds. We illustrate how our framework can be applied to several emerging network application optimizations, namely, (1) opportunistic multichannel selection, (2) data-guaranteed crowdsensing, and (3) stability-guaranteed crowdsourced transcoding. To show the effectiveness of LMG in optimizing these applications with different minimum requirements, we also conduct extensive simulations by compar- ing LMG with existing state-of-the-art policies.

Bio: John C.S. Lui is currently the Choh-Ming Li Chair Professor in the CSE Department at The Chinese University of Hong Kong (CUHK). He received his Ph.D. in Computer Science from UCLA. His current research interests are in network sciences with large data implications, machine learning on large data analytics, network/system/mobile security, network economics, large scale distributed systems and performance evaluation theory. Currently, John is the senior editor in the IEEE/ACM Transactions on Networking, and has been serving in the editorial board of IEEE Transactions on Mobile Computing, ACM Transactions on Modeling and Performance Evaluation of Computing Systems, IEEE Transactions on Computers, IEEE Transactions on Parallel and Distributed Systems, Journal of Performance Evaluation, Journal of Network Science and International Journal of Network Security. He is a member of the review panel in the IEEE Koji Kobayashi Computers and Communications Award committee, and has served at the IEEE Fellow Review Committee. He received various departmental teaching awards and the CUHK Vice-Chancellor's Exemplary Teaching Award, as well as the CUHK Faculty of Engineering Research Excellence Award. He is an elected member of the IFIP WG 7.3, Fellow of ACM, Fellow of IEEE, Senior Research Fellow of the Croucher Foundation and was the past chair of the ACM SIGMETRICS (2011-2015). His personal interests include films and general reading.

2021 ICCC

Sunday, December 12
09:20~10:05
Room A: 962 9919 4800
Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

Integrated Multifunction System – A Game-Changing Technology for Future Wireless

Ke Wu

Professor, Fellow of the IEEE, Polytechnique Montreal, Canada

Recent research and development of hardware architectures and technologies over MHz-through-THz frequency range have generated a significant momentum for future wireless applications. This leap forward is being propelled by the organic fusion of multiple functions and the scalable integration of multiple technologies through heterogeneous materials and innovative processes. This presentation begins with the overview of fundamental wireless functionalities. Emerging diversity scenarios and integration solutions in wireless technologies are reviewed in connection with performance and efficiency. Technological roadmap is highlighted with reference to enabling and building technological elements, ranging from current and emerging compound materials to evolving and beyond CMOS, and from developing substrate integrations to future electromagnetic techniques. The talk provides a brief tour of the state-of-the-art and future wireless systems featured by multifunctional interplay and integrated architecture with power efficiency and spectrum diversity for ultimate intelligence. Challenging issues and future directions of wireless technology and system development including xG and beyond are discussed.

Bio: Dr. Ke Wu is Endowed Industrial Research Chair in Future Wireless Technologies and Professor of Electrical Engineering at École Polytechnique (University of Montreal). He was the Canada Research Chair in RF and millimeter-wave engineering. He has been Director of the Poly-Grames Research Center and the Founding Director of the Center for Radiofrequency Electronics Research of Quebec. He held/holds visiting/honorary professorships at various universities around the world. Dr. Wu has graduated over 66 Ph.D. and 91 M.Sc. Students. He has authored/co-authored over 1300 referred papers, and a number of books and book chapters and filed more than 50 patents. Dr. Wu was the general chair of the 2012 IEEE MTT-S International Microwave Symposium. He was the 2016 President of the IEEE Microwave Theory and Techniques Society (MTT-S). He also served as the inaugural North-American representative in the General Assembly of the European Microwave Association. He was the recipient of many awards and prizes including the inaugural IEEE MTT-S Outstanding Young Engineer Award, 2004 Fessenden Medal of the IEEE Canada, 2009 Thomas W. Eadie Medal from the Royal Society of Canada, Queen Elizabeth II Diamond Jubilee Medal, 2013 Award of Merit of Federation of Chinese Canadian Professionals, 2014 IEEE MTT-S Microwave Application Award, the 2014 Marie-Victorin Prize (Prix du Quebec), 2015 Prix d'Excellence en Recherche et Innovation of Polytechnique Montréal, 2015 IEEE Montreal Section Gold Medal of Achievement, and 2019 IEEE MTT-S Microwave Prize. He was an IEEE MTT-S Distinguished Microwave Lecturer. Dr. Ke Wu is a Fellow of the IEEE, Canadian Academy of Engineering and Royal Society of Canada.

2021 ICCC

Sunday, December 12

10:05~10:50

Room A: 962 9919 4800

Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

Borrowing Arrows with Thatched Boats: The Art of Defeating Reactive Jammers in IoT Networks

Dusit Niyato

Professor, Fellow of the IEEE, Nanyang Technological University, Singapore

In this presentation, we introduce a novel deception strategy which is inspired by the "Borrowing Arrows with Thatched Boats" (Cǎo chuán jiè jiàn 草船借箭) strategy, one of the most famous military tactics in the history noted in historical fiction series A Romance of Three Kingdoms. The purpose is to defeat reactive jamming attacks for low-power Internet-of-Things (IoT) networks. Our proposed strategy allows resource-constrained IoT devices to be able to defeat powerful reactive jammers by leveraging their own jamming signals. More specifically, by stimulating the jammer to attack the channel through transmitting fake transmissions, the IoT system can not only undermine the jammer's power, but also harvest energy or utilize jamming signals as a communication means to transmit data through using Radio Frequency (RF) energy harvesting and ambient backscatter techniques, respectively. Furthermore, we develop a low-cost deep reinforcement learning framework that enables the hardware constrained IoT device to quickly obtain an optimal defense policy without requiring any information about the jammer in advance. Simulation results reveal that our proposed framework can not only be very effective in defeating reactive jamming attacks, but also leverage jammer's power to enhance system performance for the IoT network.

Bio: Dusit Niyato is currently a professor in the School of Computer Science and Engineering, Nanyang Technological University, Singapore. He received B.E. from King Mongkuk's Institute of Technology Ladkrabang (KMITL), Thailand in 1999 and Ph.D. in Electrical and Computer Engineering from the University of Manitoba, Canada in 2008. He has published more than 600 technical papers in the area of wireless and mobile networking, and is an inventor of four US and German patents. He won the Best Young Researcher Award of IEEE Communications Society (ComSoc) Asia Pacific (AP) and The 2011 IEEE Communications Society Fred W. Ellersick Prize Paper Award. Currently, he is serving as an editor-in-chief of IEEE Communications Surveys and Tutorials, an area editor of IEEE Transactions on Wireless Communications (Radio Management and Multiple Access), an associate editor of IEEE Transactions on Mobile Computing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Cognitive Communications and Networking, and IEEE Wireless Communications. He was a guest editor of IEEE Journal on Selected Areas on Communications. He was a Distinguished Lecturer of the IEEE Communications Society for 2016-2017. He was named the 2020-2017 highly cited researcher in computer science. He is a Fellow of IEEE.

2021 ICCC

Sunday, December 12

11:10~11:55

Room A: 962 9919 4800

Link: https://zoom.us/j/96299194800

ICCC Live Broadcast

Deep Learning for Physical Layer Communications: An Attempt towards 6G

Feifei Gao

Associate Professor, Fellow of the IEEE, Tsinghua University, China

Merging artificial intelligence in to the system design has appeared as a new trend in wireless communications areas and has been deemed as one of the 6G technologies. In this talk, we will present how to apply the deep neural network (DNN) for various aspects of physical layer communications design, including the channel estimation, channel prediction, channel feedback, data detection, and beamforming, etc. We will also present a promising new approach that is driven by both the communications data and the communication models. It will be seen that the DNN can be used to enhance the performance of the existing technologies once there is model mismatch. More interestingly, we will show that applying DNN can deal with the conventionally unsolvable problems, thanks to the universal approximation capability of DNN. With the well-defined propagation model in communication areas, we also attempt to explain the DNN under the scenario of channel estimation and reach a strong conclusion that DNN can always provide the asymptotically optimal channel estimations. We have also built test-bed to show the effectiveness of the AI aided wireless communications. In all, DNN is shown to be a very powerful tool for communications and would make the communications protocols more intelligently. Nevertheless, as a new born stuff, one should carefully select suitable scenarios for applying DNN rather than simply spreading it everywhere.

Bio: Feifei Gao received the B.Eng. degree from Xi'an Jiaotong University, China in 2002, the M.Sc. degree from McMaster University, Canada in 2004, and the Ph.D. degree from National University of Singapore in 2007. He was a Research Fellow with the Institute for Infocomm Research (I2R), A*STAR, Singapore in 2008 and an Assistant Professor with the School of Engineering and Science, Jacobs University, Bremen, Germany from 2009 to 2010. In 2011, he joined the Department of Automation, Tsinghua University, China, where he is currently an Associate Professor.

Prof. Gao's research interest include signal processing for communications, array signal processing, convex optimizations, and artificial intelligence assisted communications. He has authored/ coauthored more than 150 refereed IEEE journal papers and more than 150 IEEE conference proceeding papers that are cited more than 8000 times in Google Scholar.

Prof. Gao has served as an Editor of IEEE Transactions on Wireless Communications, IEEE Journal of Selected Topics in Signal Processing (Lead Guest Editor), IEEE Transactions on Cognitive Communications and Networking, IEEE Signal Processing Letters, IEEE Communications Letters, IEEE Wireless Communications Letters, and China Communications. He has also served as the symposium co-chair for 2019 IEEE Conference on Communications (ICC), 2018 IEEE Vehicular Technology Conference Spring (VTC), 2015 IEEE Conference on Communications (ICC), 2014 IEEE Global Communications Conference (GLOBECOM), 2014 IEEE Vehicular Technology Conference Fall (VTC), as well as Technical Committee Members for more than 50 IEEE conferences.

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Wenhui Yi

Associate Professor, Xi'an Jiaotong University, China

Wenhui Yi received the B.S., M.S., and Ph.D. degree from Xi'an Jiaotong University in 1996, 1999, and 2004 respectively. He was a Research Fellow in University of Akron, USA from 2007 to 2008. He was a visiting scholar in Massachusetts Institute of Technology from 2011 to 2013. He joined School of Electronics and Information Science and Engineering, Xi'an Jiaotong University in 2001, where he is currently an Associate Professor. Prof. Yi's current research interests include carbon-nanotube-based integrated circuits and computers, and THz generation from carbon nanotubes.

<13:30~13:50, Dec. 12> Room C: 813 2093 9916. https://us02web.zoom.us/j/81320939916

Carbon-Nanotube-Based Integrated Circuits: From Field-Effect Transistors to All Carbon Nanotube Computers

It is widely accepted that the scaling of silicon-based integrated circuits which offers historical energy-efficiency benefits will come to an end in near future. Alternative technologies maintaining advances in computing power and energy efficiency are highly desirable. With the continuously rapid development of carbon-nanotube-based integrated circuits, it is anticipated that carbon-nanotube-based integrated circuits would be one of the most promising candidates. Here, we review the advances, and explore the potential of carbonnanotube-based integrated circuits. We also examine the development of high purity semiconducting carbon nanotubes (s-SWCNTs) and CMOS field-effect transistors based on s-SWCNTs. Beyond the achievements and perspectives, the challenges in realizing carbonnanotube-based large-scale integrated circuits and all carbon nanotube computers are also considered.

Yabin Xu

Professor, Beijing Information Science and Technology University, China

Prof. Ya-bin Xu, Director, Big data security technology research institute, Beijing Information Science and Technology University. Professor, Computer school, Beijing information science and technology university. Research interests: big data security and privacy protection, social network and security, future network and security. A senior member of China computer society, the Internet branch committee member. Member of China association of artificial intelligence. Member of China communication association, cloud computing and big data branch committee member, education and popularization branch committee member. Published more than 100 papers in SCI journals, EI journals, Chinese core journals and international academic conference.

<16:30~16:50, Dec. 12> Room F: 829 8380 0562. https://us02web.zoom.us/j/82983800562

Copyright Protection Method of Big Data Based on Color Image Watermark

Data watermarking technology is an effective means of copyright protection of big data. In order to embed more real and effective color image watermarking information, firstly, based on JPEG image coding standard algorithm, the color image is compressed without affecting the image quality, so as to reduce the embedded watermark information. Then, the watermark is embedded in two dimensions: data tuple and attribute. Finally, under the constraint of data usability, the lowest bit of watermark embedding is calculated and the data is changed to complete the watermark bit embedding. In order to verify the copyright ownership of big data, this paper also presents the corresponding watermark extraction method. Watermark extraction is the reverse process of watermark embedding. First, traverse all tuples and attributes to extract the possible embedded bit values in each attribute element. Then, the actual embedded watermark bit string is determined by majority voting strategy, and the color image is restored after decoding the watermark bit string. Experimental results show that our proposed method can extract color image watermarking information under different attack conditions, the robustness of watermark is high, and the comprehensive effect of data watermark is better than the existing methods.

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Wei Zou

Associate Professor, Soochow University, China

Dr Wei Zou is currently an associate professor at the School of Electronics and Information Engineering, Soochow University. He is also the deputy director of Department of Communication Engineering. He worked as a Research Assistant in Hong Kong Polytechnic University in 2006. He was awarded a scholarship under the State Scholarship Fund to study in the University of Sydney as a joint PhD student from 2008 to 2010. He has published a number of impact research papers in the flagship journals of SPIE, BMC, and OSA. His current research interests include image reconstruction, medical imaging, and image processing.

<09:30~09:50, Dec. 13> Room F: 829 8380 0562. https://us02web.zoom.us/j/82983800562

Fluorescent Molecular Tomographic Image Reconstruction

Optical molecular imaging has been receiving much attention due to its nonionizing, low cost, and high sensitivity. Among the optical molecular imaging modalities, fluorescence molecular tomography (FMT) plays an extremely important role because of its abilities to reconstruct the spatial distribution of optical parameters, the fluorescent yield, the fluorescent lifetime, etc. In this talk, we will focus on the two problems involved in FMT reconstruction: the forward problem and the inverse problem. We will also present the efficient algorithms for image reconstruction of FMT.

Xiwen Zhang

Professor, Beijing Language and Culture University, China

Xiwen Zhang is currently a full professor in Department of Digital Media, School of Information Science, the Beijing Language and Culture University. He worked as an associated professor at the Human-computer interaction Laboratory, Institute of Software, Chinese Academy of Sciences from 2002 to 2007. Prof. Zhang 's research interests include pattern recognition, computer vision, and their applications in digital image, digital video, as well as digital ink. Prof. Zhang has published over 60 refereed journal and conference papers in his research areas. His SCI paper are published in Pattern Recognition, IEEE Transactions on Systems, Man, and Cybernetics - Part B: Cybernetics, Computer-Aided Design.

<13:30~13:50, Dec. 13> Room B: 893 7247 0884. https://us02web.zoom.us/j/89372470884

Intelligently Extracting Information from Digital Ink Chinese Text by Junior International Students

Chinese characters have complex structures. Their writing plays an import role in learning Chinese. Junior international students can use digital pen to record their handwriting as digital ink. Various information can be extracted from the digital ink text, such as text line, Chinese characters, stroke errors, shape normalization. Some intelligent methods are used to extract information in our work, such as adaptive segmentation based on histogram, classification using Hidden Markov Model and Hidden Conditional Random Field, stroke matching using Genetic Algorithm, evaluating the normalization for entire characters and their components using knowledge bases. Digital ink is a new media compared with digital image and digital video. It is captured using digital pen from handwriting and freehand drawing. Various digital pens are used with pads, smart phones, papers. Point samples are captured by digital pens, containing positions, time stamp, and pressures. Digital ink can capture more information in handwriting with less data. More details

Chutisant Kerdvibulvech

Associate Professor, National Institute of Development Administration, Thailand

Chutisant Kerdvibulvech is currently the Director of Information Technology Center, National Institute of Development Administration (NIDA), Bangkok, Thailand. He was selected to be one of the 10 most promising PhD scholars around the world to appear in the book entitled "Secrets of Promising PhD Scholars Revealed" by Enzed Publishing House Ltd, New Zealand. He received B.Eng. (Honors) in Computer Engineering from Chulalongkorn University, Bangkok, Thailand, M.Sc.Eng. and Ph.D. in Computer Engineering from Keio University, Tokyo, Japan. His research interests include computer vision, artificial intelligence, augmented reality, and metaverse.

<16:15~16:35, Dec. 13> Room D: 825 7760 2341. https://us02web.zoom.us/j/82577602341

Artificial Intelligence on Computer and Communications for Image Analytics

Artificial Intelligence for image analytics is now a popular growing field in information technology, computer science, and communication. In this talk, we introduce real-world applications of artificial intelligence on computer and communications for image analytics in recent years. Our recent works of artificial intelligence for image analytics and augmented reality are also presented. We then explore the possibilities of utilizing of artificial intelligence and big data for image analytics to solve some critical and/or important pain points of today's people, such as technical supports in engineering, health and medical issues, social media analytics for communication, image violence detections, and some specific problems during the COVID-19 pandemic. Finally, we give a conclusion and present a future scenario for artificial intelligence on computer and communications for image analytics in this new digital era.