10th International Conference on Information Science and Technology

September 9-15, 2020

Bath, London, Plymouth, UK and the Internet

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IEEE

IEEE Systems, Man and Cybernetics Society Portsmouth Chapter

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Welcome Messages

On behalf of the Organizing Committee of the 10th International Conference on Information Science and Technology (ICIST2020), we welcome you to attend this event taking place in England and over the Internet during September 9-15, 2020. This event has been postponed for more than a month due to the COVID-19 pandemic. Following the successfully held preceding events in this series, ICIST has become a well-established series of popular and high-quality conferences on the theory and methodology of information sciences and their applications. ICIST2020 aims to provide a high-level international forum for scientists, engineers, and educators to present the state of the art of information science research and applications in related fields. The conference also featured plenary speeches given by world renowned scholars, regular sessions with a broad coverage, and special sessions focusing on popular topics.

This year, the conference received 88 submissions, much less submissions than previous years, due to an obvious reason. Each submission was reviewed by at least two, and on average, at least three program committee members. After the rigorous peer reviews, the committee decided to accept 43 papers for publication in the proceedings with an acceptance rate of less than 49%. These papers cover many topics of neural network-related research including computational intelligence, robotics and automation, pattern recognition, image processing, information security, transportation systems. In addition to the contributed papers, ICIST2020 technical program includes two plenary speeches by world renowned scholars: Prof. Qing-Long Han (IEEE Fellow and Pro Vice-Chancellor) at Swinburne University of Technology and Prof. Yaochu Jin (IEEE Fellow and Editor-in-Chief of the IEEE Transactions on Cognitive and Developmental Systems) at the University of Surrey, Guildford, UK.

Many organizations and volunteers made great contributions toward the success of this symposium. We would like to express our sincere gratitude to the University of Bath and City University of Hong Kong for their sponsorships, the IEEE Systems, Man and Cybernetics Society for its technical co-sponsorship. We would also like to sincerely thank all the committee members for their great efforts in organizing the symposium. Special thanks to the Program Committee members and reviewers whose insightful reviews and timely feedback ensured the high quality of the accepted papers and the smooth flow of the symposium. Finally, we would like to thank all the speakers, authors, and participants for their supports.

Honghai Liu and Jun Wang, General Chairs

Zhaojie Ju, Charlie Yang, and Dingguo Zhang, Organizing Chair

Peng Li, Yingjie Yang, and Jing Zhou, Program Chairs

ICIST History

9th International Conference on Information Science and Technology
August 2-August 5, 2019, Hulunbuir, China

8th International Conference on Information Science and Technology
June 30-July 6, 2018, Cordoba, Granada, and Seville, Spain

7th International Conference on Information Science and Technology
April 16-19, 2017, Da Nang, Vietnam

6th International Conference on Information Science and Technology
May 6-8, 2016, Dalian, China

5th International Conference on Information Science and Technology
April 24-26, 2015, Changsha, China

4th International Conference on Information Science and Technology
April 26-28, 2014, Shenzhen, China

3rd International Conference on Information Science and Technology
March 27-28, 2013, Yangzhou, China

2nd International Conference on Information Science and Technology
March 23-25, 2012, Wuhan, China

1st International Conference on Information Science and Technology
March 26-28, 2011, Nanjing, China

Organizing Committee

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Jun Wang   City University of Hong Kong, Hong Kong

Organizing Chairs

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Charlie Yang   University of West England, Bristol, UK
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Publicity Chairs

Min Han   Dalian University of Technology, Dalian, China
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Nian Zhang   University of District of Columbia, Washington DC, USA

Publications Chairs

Hangjun Che   Southwest University, Chongqing, China
Jin Hu   Chongqing Jiaotong University, Chongqing, China
Man-Fai Leung   Open University of Hong Kong, Hong Kong

Registration Chairs

Shenshen Gu   Shanghai University, Shanghai, China
Qingshan Liu   Southeast University, Nanjing, China
Zhenyu Lu   Nanjing Univ. of Information Sci. and Tech., Nanjing, China

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Uriel Martinez Hernandez   University of Bath, Bath, UK
Fudong Li   University of Portsmouth, Portsmouth, UK
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Jie Zhang	Newcastle University
Jing Zhou	University of Agder

Keynote Speeches

Keynote Speech I:
Dynamic Event-Triggered Distributed Coordination Control and Its Applications

Distinguished Professor Qing-Long Han, FIEEE, FIEAust

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Swinburne University of Technology
Melbourne, Vic 3122, Australia
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Abstract

Distributed coordination control is the current trend in networked systems and finds prosperous applications across a variety of fields, such as smart grids and intelligent transportation systems. One fundamental issue in coordinating and controlling a large group of distributed and networked agents is the influence of intermittent inter-agent interactions caused by constrained communication resources. Event-triggered communication scheduling stands out as a promising enabler to strike a balance between the desired control performance and the satisfactory resource efficiency. What distinguishes dynamic event-triggered scheduling from traditional static event-triggered scheduling is that the triggering mechanism can be dynamically adjusted over time in accordance with both available system information and additional dynamic variables. This keynote talk provides an up-to-date overview of dynamic event-triggered distributed coordination control. The motivation of dynamic event-triggered scheduling is first introduced in the context of distributed coordination control. Then some techniques of dynamic event-triggered distributed coordination control are discussed in detail. Implementation and design issues are well addressed. Furthermore, this keynote talk exemplifies two applications of dynamic event-triggered distributed coordination control in the fields of microgrids and automated vehicles. Several challenges are suggested to direct the future research.

Biosketch

Qing-Long Han received Ph.D. degree in Control Engineering and Electrical Engineering from East China University of Science and Technology, Shanghai, China, in 1997. From September 1997 to December 1998, he was a Post-doctoral Researcher Fellow with the **L**aboratoire d'**A**uomatique et d'**I**nformatique **I**ndustrielle (LAII) (currently, **L**aboratoire d'**I**nformatique et d'**A**utomatique pour les **S**ystèmes, LIAS), **É**cole **S**upérieure d'**I**ngénieurs de **P**oitiers (ESIP) (currently, **É**cole **N**ationale **S**upérieure d'**I**ngénieurs de **P**oitiers (ENSIP)), Université de Poitiers, France. From January 1999 to August 2001, he was a Research Assistant Professor with the Department of Mechanical and Industrial Engineering at Southern Illinois University at Edwardsville, USA. From September 2001 to December 2014, he was Laureate Professor, Associate Dean (Research and Innovation) with the Higher Education Division, and the

Founding Director of the Centre for Intelligent and Networked Systems at Central Queensland University, Australia. From December 2014 to May 2016, he was Deputy Dean (Research), with the Griffith Sciences, and a Professor with the Griffith School of Engineering, Griffith University, Australia. In May 2016, he joined Swinburne University of Technology, Australia, where he is currently Pro Vice-Chancellor (Research Quality) and a Distinguished Professor. He is also the Director of Centre for Networked Control Systems with the School of Mechatronic Engineering and Automation, Shanghai University, China.

Professor Han has been conducting research in the field of Control Theory and Control Engineering. He has published has been conducting research in the field of networked control systems, multi-agent systems, time-delay systems and neural networks. Since 2001, he has published **three hundred and four (304)** fully-refereed high quality journal articles including **thirty-six (36) articles** in **Automatica and one hundred and sixty-two (162)** in the **most prestigious IEEE Transactions**. He has also published **one hundred and eighty-one (181)** leading conference papers, **five (5)** monographs, **one (1)** research-based book chapter, and edited **four (4)** conference proceedings and **ten (10)** special issues.

As of 27 August 2020, Professor Han's research work has been cited **26992 times** with **h-index of 89**, **i10-index** of **261** according to Google Scholar. Guide2Research team released the 6th Edition of its 2020 Ranking of **Top 1000** Scientists in the field of **Computer Science and Electronics** on May 20, 2020. Professor Han has been ranked in the **top 5** researchers in Australia (http://www.guide2research.com/scientists/AU). This ranking is based in the h-index metric provided by Google Scholar and DBLP. Furthermore, his research work has been cited **21906 times** with **h-index** of **82** according to SCOPUS, and **18811 times** with **h-index** of **76** according to Clarivate Analytics Web of Science Core Collection. The **Essential Science Indicator's (ESI)** Report on 9 July 2020, which covers the period from **January 2010** to **March/April 2020**, indicates that he has **69 Highly Cited Papers**.

Professor Han is one of **Australia's Top 5 Lifetime Achievers (Stars of Research) in the discipline area of Engineering and Computer science,** and **Australia's Top 40 Lifetime Achievers (Stars of Research) in all the discipline areas in The Australian's 2019 Research Magazine**, published on 25 September 2019. **Lifetime achievers:** This list shows 40 top achievers over their research careers thus far. It lists a top five (not in order of achievement) in each of eight discipline areas: business, economics and management; social sciences; engineering and computer science; physics and mathematics; health and medical sciences; humanities, arts and literature; life sciences; and chemical and material sciences **(https://specialreports.theaustralian.com.au/1540291/).**

Professor Han is a Highly Cited Researcher according to Clarivate Analytics (formerly Thomson Reuters). He is **a Fellow of The Institute of Electrical and Electronic Engineers** (FIEEE) and a **Fellow of The Institution of Engineers Australia** (FIEAust). He is an Associate Editor of a number of international journals including IEEE Transactions on Cybernetics, IEEE Transactions on Industrial Informatics, IEEE Industrial Electronics Magazine, IEEE Journal of Emerging and Selected Topics in Industrial Electronics, Control Engineering Practice, IEEE/CAA Journal of Automatica Sinica, and Information Sciences.

Keynote Speech II:
Recent Advances in Communication Efficient Federated Learning

Yaochu Jin

Department of Computer Science
University of Surrey, Guildford, U.K.

Abstract

Federated learning is a new distributed learning paradigm that can preserve data privacy in machine learning. One of the main challenges in federated learning is to reduce the communication costs for transmitting model parameters from local devices to the central server and vice versa. This talk presents some most recent work on communication efficient federated learning, including constructing compact local models, introducing heterogeneous parameter updating, and using ternary quantization. Finally, future directions of research in federated learning will be briefly discussed.

Biosketch

Yaochu Jin received the BSc, MSc, and PhD degrees from Zhejiang University, Hangzhou, China, in 1988, 1991, and 1996, respectively, and the Dr.-Ing. degree from Ruhr University Bochum, Germany, in 2001.

He is currently a Distinguished Chair, Professor in Computational Intelligence, Department of Computer Science, University of Surrey, Guildford, U.K., where he heads the Nature Inspired Computing and Engineering Group. He was a "Finland Distinguished Professor" of University of Jyvaskyla, Finland, a "Changjiang Distinguished Visiting Professor", Northeastern University, China, and "Distinguished Visiting Scholar", University of Technology Sydney, Australia. His main research interests include data-driven surrogate-assisted evolutionary optimization, trustworthy machine learning, multi-objective evolutionary learning, swarm robotics, and evolutionary developmental systems.

Dr Jin is presently the Editor-in-Chief of the IEEE TRANSACTIONS ON COGNITIVE AND DEVELOPMENTAL SYSTEMS and the Editor-in-Chief of Complex & Intelligent Systems. He was an IEEE Distinguished Lecturer, and Vice President of the IEEE Computational Intelligence Society. He is the recipient of the 2018 and 2020 IEEE Transactions on Evolutionary Computation Outstanding Paper Award, the 2014, 2016, and 2019 IEEE Computational Intelligence Magazine Outstanding Paper Award, and the Best Paper Award of the 2010 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology. He is recognized as a Highly Cited Researcher 2019 by the Web of Science Group. He is a Fellow of IEEE.

Technical Program

September 9, 2020

Tutorial Session
Imperial College London
London, UK

September 10, 2020

Opening Ceremony

9:45-10:00 (all time slots in London Time (i.e., British Summer Time –BST)

Keynote Speech I
Prof. Qing-Long Han, IEEE Fellow
Swinburne University of Technology, Melbourne, Australia
10:00-11:00

Keynote Speech II
Prof. Yaochu Jin, IEEE Fellow
University of Surrey, Guildford, UK
11:00-12:00

Lunch break

S1: Robotics and Mechatronics
Chairs: Chenguang Yang and Zhanshan Wang

13:30 -13:50	*PDE Control of Vehicle-mounted Flexible Link with Input Saturation and Disturbances*
	Xueyan Xing, Jinkun Liu and Chenguang Yang
13:50 - 14:10	*Trajectory Planning of Fixed-wing UAV Using Kinodynamic RRT* Algorithm*
	Jiahao Ge, Li Liu, Xinxin Dong and Weiyong Tian
14:10 - 14:30	*New-Type DTZ Model for Solving Discrete Time-Dependent Nonlinear Equation System with Robotic-Arm Application*
	Jinjin Guo, Binbin Qiu and Yunong Zhang
14:30 - 14:50	*Research on Structural Optimization Design and Trajectory Planning of Frog-inspired Robot*
	He Zhang, Jizhuang Fan, Bowen Yuan and Gangfeng Liu
14:50 - 15:10	*Sliding Mode Dynamic Surface Control with Time Delays and Dead-zones in the Multi-machine Power Systems*
	Shuran Wang and Zhanshan Wang
15:10 - 15:30	*An Automatic Rehabilitation Assessment System for Hand Function Based on Leap*

Motion and Ensemble Learning

Chenguang Li, Long Cheng, Hongjun Yang and Yongxiang Zou

Coffee break

S2: Computational Intelligence
Chairs: Nian Zhang and Shenshen Gu

15:40 -16:00 *A Pointer Network Based Deep Learning Algorithm for Maximum Clique Problem*

Shenshen Gu and Hanmei Yao

16:00 -16:20 *Convergence Analysis of the Learning Algorithms for Multi-Valued Neurons*

Shuang Liang, Dongpo Xu and Jinling Liang

16:20 -16:40 *Lexical and Compositional Stream Learning for Event Detection with Sememe Knowledge*

Jiale Yuan, Xin Xin and Ping Guo

16:40 -17:00 *A Neurodynamic Optimization Approach for L1 Minimization with Application to Compressed Image Reconstruction*

Chengchen Dai, Hangjun Che and Man-Fai Leung

17:00 -17:20 *Fuzzy Coefficient of Impulsive Intensity in a Nonlinear Impulsive Control System*

B. Onasanya, Yuming Feng, Wei Zhang and Jiang Xiong

17:20 -17:40 *Wind Speed Prediction and Visualization Using Long Short-Term Memory Networks (LSTM)*

Amimul Ehsan, Amir Shahirinia, Nian Zhang and Timothy Oladunni

September 11, 2020

S3: Optimization
Chairs: Zhi-Hui Zhan and Bo Zhao

8:00 -8:20 *Observer Based Event-triggered Fault Compensation Control for Nonlinear Systems via Adaptive Dynamic Programming*

Fangchao Luo, Bo Zhao and Derong Liu

8:20 -8:40 *An Improved Competitive Mechanism based Particle Swarm Optimization Algorithm for Multi-Objective Optimization*

Man Chung Yuen, Sin-Chun Ng and Man-Fai Leung

8:40 -9:00 *Bridge Connecting Multiobjetive Optimization to Multimodal Optimization*

Zhi-Hui Zhan, Zong-Gan Chen and Jun Zhang

9:00 -9:20 *Double-Like Accelerated Distributed Optimization Algorithm for Convex Optimization Problem*

Keke Zhang, Jiang Xiong and Xiangguang Dai

9:20 -9:40	*Alternative Mutation Operators in Collaborative Neurodynamic Optimization*

Xinqi Li, Jun Wang and Sam Kwong

9:40 -10:00	*A Novel Gradient Neural Network for Tackling the Complex-valued System of Linear Equations Online*

Lei Ding, Lin Xiao, Kaiqing Zhou, Bolin Liao, Chen Peng, Jianfeng Li and Liping Mo

Coffee break

S4: Image Processing
Chairs: Chengan Guo and Jianchao Fan

10:10 - 10:30	*Robust Segmentation of 3D Brain MRI Images in Cross Datasets by Integrating Supervised and Unsupervised Learning*

Xiaoxue Wang, Chengan Guo and Xiangjun Zhou

10:30 - 11:50	*Multiple Background Island Bird Detection Based on Faster R-CNN*

Jianchao Fan, Xiang Wang and Yujuan Ma

10:50 - 11:10	*Target Position and Posture Recognition Based on RGB-D Image for Autonomous Grasping Robot Arm Manipulation*

Yang Chen, Li Zhuohan, Cai Zhiwei, Gao Yanan, Xu Te, He Guojian, Yan Fei and Shao Cheng

11:10 - 11:30	*Research on Verification Techniques of Common Glass Measuring Capacity Based on Image Processing*

Jie Chen, Yang Shen, Bin Li and Zhenqi Shen

11:30 - 12:50	*Fault Classification of High Voltage Transmission Line Based on Convolutional Neural Network*

Wanyu Ye, Shengchao Jian, Ruiming Ou, Shaochuan Huang, Xiang Gong, Xiangang Peng and Haoliang Yuan

Lunch break

S5: Pattern Recognition
Chairs: Sin-Chun Ng and Kaizhu Huang

13:20 -13:40	*An Intelligent Banknote Recognition System by using Machine Learning with Assistive Technology for Visually Impaired People*

Sin-Chun Ng, Chok-Pang Kwok, Sin-Hang Chung, Yuen-Yan Leung and Hoi-Shan Pang

13:40 -14:00	*Super-resolving Tiny Faces with Face Feature Vectors*

Yangkai Luo and Kaizhu Huang

14:00 -14:20	*Two-Dimensional Semi-Supervised Feature Selection*

Junyu Li, Xin Liang, Peijie Li, Weile Zhang, Qintao Du and Haoliang Yuan

14:20 -14:40	*Adaptive Features Fusion Correlation Filter for Real-time Object Tracking*
	Chenjie Du, Mingyu Gao, Mengyang Lan, Zhekang Dong, Haibin Yu and Zhiwei He
14:40 -15:00	*A New Approach for Feature Subset Selection using Quantum Inspired Owl Search Algorithm*
	Ashis Kumar Mandal, Rikta Sen, Saptarsi Goswami, Amlan Chakrabarti and Basabi Chakraborty
15:20 -15:40	*Hierarchical Multitask Learning for Improved Underwater Recognition on Imbalanced Tasks*
	Filipa Castro, Pedro Costa, Filipe Marques and Manuel Parente

Coffee break

S6: Intelligent Transportation Systems
Chairs: Anton Agafonov and Adel Almohammad

16:00 – 16:20	*Improved LSTM Based on Attention Mechanism for Short-term Traffic Flow Prediction*
	Dejun Chen, Congcong Xiong and Ming Zhong
16:20 – 16:40	*Learning Based Lane-change Behaviour Detection for Intelligent and Connected Vehicles*
	Luyao Du, Wei Chen, Zhonghui Pei, Hongjiang Zheng, Kang Chen and Di Wu
16:40 – 17:00	*A Hybrid Intelligent Traffic Light System for Solving Traffic Congestion in Hong Kong*
	Sin-Chun Ng, Chok-Pang Kwok, Yu-Chung Fung, Chun-Yung So and Yuen-Ho Lam
17:00 – 17:20	*Traffic Flow Prediction Using Graph Convolution Neural Networks*
	Anton Agafonov
17:20 – 17:40	*Public Twitter Data and Transport Network Status*
	Adel Almohammad and Panagiotis Georgakis
17:40 – 18:00	*A Method of Preference and Utility Elicitation By Pairwise Comparisons and its Application to Intelligent Transportation Recommendation Systems*
	Aleksandr Borodinov, Anton Agafonov and Vladislav Myasnikov

<p style="text-align:center">September 12, 2020</p>

S7: Complex Networks
Chairs: Jinling Liang and Qingshan Liu

8:20 - 8:40	*Adaptive State Observer Design for Dynamic Links in Complex Dynamical Networks*
	Zilin Gao, Jiang Xiong, Jing Zhong, Fuming Liu and Qingshan Liu
8:40 - 9:00	*Synchronization of Memristor-Based Coupled Neural Networks with Delay via Intermittent*
	Jiejie Chen, Boshan Chen and Zhigang Zeng

9:00 - 9:20	*Pinning Control for Asymmetric Bipartite Consensus of Antagonistic Multi-agent Networks with Delays*
	Xing Guo, Jinling Liang, Shuang Liang and Jianquan Lu
9:20 -9:40	*Boosting the Robustness of Capsule Networks with Diverse Ensemble*
	Yueqiao Li, Hang Su, Jun Zhu and Jun Zhou

Coffee break

S8: Information Security
Chairs: Jinling Liang and Qingshan Liu

10:00 -10:20	*A Defensive Strategy for Integrity Detection in Cyber-Physical Systems Subject to Deception Attacks*
	Xinwei Ren, Jinling Liang and Qingshan Liu
10:20 -10:40	*A Representation of Business Oriented Cyber Threat Intelligence and the Objects Assembly*
	Yuanchen Xu, Yingjie Yang and Ying He
10:40 -11:00	*A New Automatic Detection System Design of Malicious Behavior Based on Software Behavior Sequence*
	Chong Jiang and Qifu Qu
11:00 -11:20	*Classification Method for Network Security Data Based on Multifeatured Extraction*
	Yunchuan Kang, Jing Zhong, Ruofeng Li, Yuqiao Liang, Jiang Xiong and Nian Zhang
11:20 -11:40	*A Soft Sensor Based on Influent Mode Discrimination Neural Network for A Wastewater Treatment Process*
	Fei Ling and Kaibiao Sun

Lunch break

S9: Information Processing
Chairs: Amal Khalifa and Nian Zhang

14:00 -14:20	*A Novel Battery Matching Algorithm Based on Discharge Curve*
	Mingyu Gao, Yanyi Wang, Junwen Zhong, Shangyang Liu, Zhiwei He and Zhekang Dong
14:20 -14:20	*The Exploration of the Reasoning Capability of BERT in Relation Extraction*
	Lili Li, Xin Xin and Ping Guo
14:20 -14:40	*Weighted Nonnegative Matrix Factorization for Image Recovery and Representation*
	Xianguang Dai, Keke Zhang, Jiang Xiong, Xianxiu Zhang, Zhengwen Tu and Nian Zhang
14:40 -15:00	*Multi-Wavelength Narrow Linewidth Random Fiber Laser Based on Fiber Bragg*

Grating Fabry-Perot Filter

Sokliep Pheng, Xiaonan Luo, Zhongshuai Wang, Yijie Zhu and Zetao Jiang

15:00 - 15:20   *Impact of Content Popularity on Content Finding in NDN: Default NDN vs. Vicinity-based Enhanced NDN*

Atthapol Suwannasa, Matthew Broadbent and Andreas Mauthe

15:20 - 15:40   *A Blind DNA-Steganography Approach Using Ciphering and Random Sequence Splicing*

Amal Khalifa

September 13-14, 2020

Post-Conference Workshop
Plymouth University
Plymouth, UK