2022 16th IFAC Symposium on Large Scale Complex System: Theory and Applications (IFAC LSS 2022)

April 23-24, 2022, Xi'an, China

Program Digest

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2022 16th IFAC Symposium on Large Scale Complex System: Theory and Applications (*IFAC LSS 2022*)

April 23-24, 2022, Xi'an, China

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Welcome Address

On behalf of the Organization and the Program Committees, it gives us great pleasure to invite you to participate in the The 16th IFAC Symposium on Large Scale Complex Systems: Theory and Applications (IFAC-LSS-2022), which will be held in Xi'an, China, 23-24 April 2022.

The IFAC Symposium on Large Scale Complex Systems is a core triennial event of IFAC Technical Committee on Large Scale Complex Systems and the Xi'an Symposium marks the 16st edition of this series.

Your contribution submitted to the IFAC-LSS-2022 has been accepted for presentation at the conference. As indicated in the notification letter sent to you about your paper's acceptance, at least one author of your paper is expected to attend the conference to present your paper. We hope that you will participate in this scientific meeting and help to make it a memorable event.

Acceptance of your paper for presentation does not, in any way, financially oblige either IFAC-LSS-2022 nor IFAC for the expenses incurred by you to travel and attend the conference. If you have any questions, please contact us.

Thank you in advance for your participation. We look forward to seeing you in Xi'an.

Catalogue

Plenary Lecture

Saturday, April 23, 2022, 9:10-9:50, Tencent Meeting: 919 710 544 Chair: Yu Zhao (Northwestern Polytechnical University) Co-Chair: Chaoyuan Hou (Northwestern Polytechnical University)	

Time	Keynote Speaker
9:10-9:50	Guanrong Chen (City University of Hong Kong)

Guanrong Chen

Speak Title: Robustness of Complex Network Controllability

Introduction to the Speaker: Guanrong Chen (Life Fellow, IEEE) received the M.Sc. degree in computer science from Sun Yatsen University, Guangzhou, China, in 1981, and the Ph.D. degree in applied mathematics from Texas A&M University, College Station, TX, USA, in 1987.

He has been a Chair Professor and the Founding Director of the Centre for Chaos and Complex Networks, City University of Hong Kong, Hong Kong, since 2000. Prior to that, he was a Tenured Full Professor with the University of Houston, Houston, TX, USA.

Prof. Chen was awarded the 2011 Euler Gold Medal, Russia, and conferred Honorary Doctorate by the Saint Petersburg State University, Russia, in 2011 and by the University of Le Havre, Normandy, France, in 2014. He has been a Highly Cited Researcher in Engineering according to Thomson Reuters since 2009. He is a Member of the Academy of Europe since 2014 and a Fellow of The World Academy of Sciences since 2015.

Saturday, April 23, 2022, 14:00-14:40, Tencent Meeting: 146 713 964	
Chair: Yu Zhao (Northwestern Polytechnical University)	
Co-Chair: Chaoyuan Hou (Northwestern Polytechnical University)	

Time	Keynote Speaker
14:00-14:40	Ming Cao (University of Groningen)

Ming Cao

Speak Title: Analysis, prediction and control of epidemics

Introduction to the Speaker: Ming Cao is the director of the Jantina Tammes School of Digital Society, Technology and AI, and a professor of systems and control at the University of Groningen, the Netherlands. He received the Bachelor degree in 1999 and the Master degree in 2002 from Tsinghua University, China, and the Ph.D. degree in 2007 from Yale University, USA, all in Electrical Engineering. From 2007 to 2008, he was a Research Associate at Princeton University, USA. He worked as a research intern in 2006 at the IBM T. J. Watson Research Center, USA. He is the 2017 and inaugural recipient of the Manfred Thoma medal from the International Federation of Automatic Control (IFAC) and the 2016 recipient of the European Control Award sponsored by the European Control Association (EUCA). He is an IEEE fellow. He is a Senior Editor for Systems and Control Letters, an Associate Editor for IEEE Transactions on Automatic Control, IEEE Transactions on Control of Network Systems and IEEE Robotics and Automation Magazine, and was an associate editor for IEEE Transactions on Circuits and Systems and IEEE Circuits and Systems Magazine. He is a member of the IFAC Conference Board and a vice chair of the IFAC Technical Committee on Large-Scale Complex Systems. His research interests include autonomous agents and multi-agent systems, complex networks and decision-making processes.

Invited Group (Morning Sessions)

Session 1: Formation Control

Saturday, April 23, 2022, 10:00-12:00, Tencent Meeting: 303 560 178
Chair: Zhongkui Li (Peking University)
Co-Chair: Kai Gao (Northwestern Polytechnical University)

Paper ID	Time	Title	Authors
52	10:00-10:20	Fully Distributed Event-Triggered Affine Formation Maneuver Control over Directed Graphs	Zeze Chang, Junjie Wang, Zhongkui Li* (Peking University)
57	10:20-10:40	A Novel Smooth Design for Globally Three-agent Rigid Formation	Ruibo Guo, Yangyang Chen*, Faxiang Zhang (Southeast University)
45	10:40-11:00	Formation Control of Fixed Wing UAV with a Novel Transition Function	Disha Zhu, Jianying Yang* (Peking University)
19	11:00-11:20	Time-Varying Formation Tracking Control for Unmanned Aerial Vehicles: Theories and Applications	Qing Li, Yongzhao Hua*, Xiwang Dong, Zhang Ren (Beihang University)
58	11:20-11:40	An Optimal Design of The Leader-Following Formation Control for Discrete Multi-agent Systems	Shijie Chen, Jiahao Dai, Jingwen Yi*, Li Chai (Wuhan University of Science and Technology)
76	11:40-12:00	Interception Decision and Control for the Formation of Surface Vehicles	Yu Lu*, Ruisheng Sun, Kun Zhang, Yuan Li, Wei Chen (Nanjing University of Science and Technology)

Session 2: Machine Learning

Paper ID	Time	Title	Authors
75	10:00-10:20	Adaptive Double Fuzzy Systems Based Q-Learning for Pursuit-Evasion Game	Shuaizheng Liu, Xiaoxiang Hu*, Kejun Dong (Northwestern Polytechnical University)
17	10:20-10:40	Robust Cooperative Attack of Multiple Missiles with External Disturbances and Communication Delay	Ao Li, Zhenghong Deng, Xiaoxiang Hu* (Northwestern Polytechnical University)
74	10:40-11:00	Distributed Reinforcement Learning Algorithm for Multi-Wave Fire Fighting Scheduling Problem	Xiaoyu Chen, Junjie Fu, Jialing Zhou*, Yuheng Li (Nanjing University of Science and Technology)
54	11:00-11:20	Indirect Adaptive FuzzyControl with a New Control Input Transformation	Faxiang Zhang, Yangyang Chen* (Southeast University)
14	11:20-11:40	Opinion Dynamics Analysis of Nucleus Hegselmann-Krause Model in Social Networks	Xiaomiao Xi, Qingsong Liu*, Li Chai (Wuhan University of Science and Technology)
44	11:40-12:00	Designing Cooperative Covering Strategy for Intercepting a Maneuvering Target	Ziwei Guo, Tao Xu, Zhao Zhang, Zhisheng Duan* (Peking University)

Saturday, April 23, 2022, 10:00-12:00, Tencent Meeting: 990 292 923
Chair: Xiaoxiang Hu (Northwestern Polytechnical University)
Co-Chair: Shuo Yang (Northwestern Polytechnical University)

Session 3: Distributed Control and Games

Saturday, April 23, 2022, 10:00-12:00, Tencent Meeting:538 866 000
Chair: Maojiao Ye (Nanyang Technological University)
Co-Chair: Yuan Zhou (Northwestern Polytechnical University)

Paper ID	Time	Title	Authors
31	10:00-10:20	Distributed Nash Equilibrium Seeking for Aggregative Games over Weight-Unbalanced Digraphs	Dong Wang*, Pan Chen, Mingfei Chen, Jie Lian,Wei Wang (Dalian University of Technology)
67	10:20-10:40	Distributed Dynamic Event-triggered Consensus Control for Multiple Euler-Lagrange Systems under Digraphs	Minfeng Wei, Yunge Zang, Fengdi Zhang* (Beijing Aerospace Automatic Control Institute)
34	10:40-11:00	A Novel Modeling and Scheduling Method for Signalized Roundabouts	Peihu Duan, Lingying Huang, Yuezu Lv* (Beijing Institute of Technology)
59	11:00-11:20	Complex Network-based Pinning Control of Drone Swarm	Jinhao Zhou, Kexin Liu, Yuezu Lv, Lei Chen* (Beijing Institute of Technology)
65	11:20-11:40	Multi-ASV Motion Planning for Formation Reconfiguration based on Control Barrier Functions	Yanping Xu, Lu Liu*, Yibo Yin, Dan Wang, Zhouhua Peng (Dalian Maritime University)
48	11:40-12:00	Data-Driven Fault Tolerant Control for Discrete-Time Systems based on LMI	Yucong Sun, Quanyong Fan*, Hongxia Li, Hongquan Ren (Northwestern Polytechnical University)

Regular Group (Afternoon Sessions)

Session 1: Event Triggered Communication

Saturday, April 23, 2022, 15:00-17:20, Tencent Meeting: 129 673 532
Chair: Chengxin Xian (Northwestern Polytechnical University)
Co-Chair: Qianle Tao (Northwestern Polytechnical University)

Paper ID	Time	Title	Author
51	15:00-15:20	Recognition of Tightly-Stacked Bagged Agricultural Materials for a Handling Robot	Han Li*, Zhaoxin Guan (Jianghan University)
25	15:20-15:40	Dynamic Study of a Stochastic Holling III Predator-prey System with a Prey Refuge	Yuke Zhang, Xinzhu Meng* (Shandong University of Science and Technology)
29	15:40-16:00	Stability Analysis of Positive Systems with Delayed Impulses	Fuqi Zheng, Ticao Jiao*, Guangdeng Zong (Shandong University of Technology)
56	16:00-16:20	Adaptive Grouping Weapon-Target Assignment with Field-of-view Angle Constraint	Yilun Huangfu, Yonghua Fan, Guofei Li*, Chenlu Li (Northwestern Polytechnical University)
63	16:20-16:40	An Adjusting Strategy after DBSCAN	Runfa zhang, Jianlong Qiu *, Ming Guo, Huixia Cui, Xiangyong Chen (USA) (Linyi University)
33	16:40-17:00	Research on Intelligent Construction Technology of Information-driven Power Grid Security Situation Knowledge Graph	Fei Yuan*, Hongying Yang, Gaoshang Zhao, Shaobo Yang (Northeast Electric Power University)
47	17:00-17:20	Distributed Filtering with	Jiachen Qian,

		Random-triggered Communication Mechanism	Peihu Duan, Yunxiao Ren, Zhisheng Duan* (Peking University)

Session 2: Machine Learning

Saturday, April 23, 2022, 15:00-17:00, Tencent Meeting: 867 360 351
Chair: Yuquan Zhang (Northwestern Polytechnical University)
Co-Chair: Zheng Du (Northwestern Polytechnical University)

Paper ID	Time	Title	Author
18	15:00-15:20	A Fault Diagnosis Method for Unbalanced Data Based on a Deep Cost Sensitive Convolutional Neural Network	Jing He, Ling Yin, Changfan Zhang, Jianhua Liu*, Haonan Yang (Hunan University of Technology)
38	15:20-15:40	Research on Dynamic Measurement of Ring Hot Rolling Dimension Based on Machine Vision	Zhihao Xiong, Zhijiang Zuo*, Han Li, Libo Pan (Jianghan University)
39	15:40-16:00	Research on Visual Inspection Method and Instrument of Solder Joint	Wenjie Shi, Zhijiang Zuo*, Han Li, Libo Pan (Jianghan University)
50	16:00-16:20	Design a Robot System for Tomato Harvesting Based on YOLO v5	Zhaoxin Guan, Han Li*, Zhijiang Zuo (Jianghan University)
60	16:20-16:40	Model Predictive Control for T-S Fuzzy Markovian Jump Systems Using Dynamic Prediction Optimizing	Bin Zhang, Yan Song* (University of Shanghai for Science and Technology)
16	16:40-17:00	The Matching Degrees of Research Projects with Their Papers	Lixin Zhao, Yinghong Ma* (Shandong Normal University)

Session 3: Distributed Control

Paper ID	Time	Title	Author
Saturday, April 23, 2022, 15:00-17:00, Tencent Meeting: 476 603 988			

Saturday, April 23, 2022, 15:00-17:00, Tencent Meeting: 476 603 988
Chair: Zhixuan Su (Northwestern Polytechnical University)
Co-Chair: Zeyu Sun (Northwestern Polytechnical University)

Paper ID	Time	Title	Author
30	15:00-15:20	Distributed Secondary Control for DC Microgrid with Prescribed Perforamace	Qifan Yuan*, Yanwu Wang, Xiaokang Liu (Huazhong University of Science and Technology)
10	15:20-15:40	A Fully Distributed Approach to the Vehicles Platooning with Switching Topologies and Input Saturation	Xingming Deng, Jingyao Wang* (Xiamen University)
12	15:40-16:00	One-Bit Function Perturbation Impact on Attractors of Large-Scale Probabilistic Logical Networks	Xinrong Yang, Haitao Li* (Shandong Normal University)
37	16:00-16:20	Distributed Network Reconstruction Strategy for Multi-agent Systems	Yu Feng, Fuyong Wang*, Zhongxin Liu, Zengqiang Chen (Nankai University)
11	16:20-16:40	A Fully Distributed Approach to the Robust Consensus Control of MAS with Markovian Randomly Switching Topologies	Yige Li, Jingyao Wang* (Xiamen University)
20	16:40-17:00	Distributed Continuous-time Algorithm for Resource Allocation over Unbalanced Directed Network	Xiasheng Shi, Zhiyun Lin* (China University of Mining and Technology)

Session 4: Complex Systems and Nonlinear Processing

Saturday, April 23, 2022, 15:00-17:20, Tencent Meeting: 295 791 297
Chair: Li Li (Northwestern Polytechnical University)
Co-Chair: Yatao Ren (Northwestern Polytechnical University)

Paper ID	Time	Title	Author
32	15:00-15:20	Fixed-time Synchronization of	Mingyu Wang, Jianlong Qiu *,

Paper ID		Title	Author
		Stochastic Complex Networks with Mixed Delays via Intermittent Control	Yuying Yan, Zhao Feng, Xiangyong Chen (Linyi University)
79	15:20-15:40	A Numerical Algorithm for Solving Power-exponent Type Nonlinear Inequalities with Applications in Calculating Stabilizing Parameters for LTI Systems	Zhihua Chen*, Yong Guo, Kai Zhang, Yongchun Xie (Beijing Institute of Control Engineering)
24	15:40-16:00	Dynamics of Stochastic Chemostat Models with Mixed Nonlinear Incidence	Yue Dong, Xinzhu Meng* (Shandong University of Science and Technology)
26	16:00-16:20	Dynamics Study of a Stochastic SIQR Epidemic Model with Vaccination and Saturated Incidence	Hengqian Li, Xiurong Guo* (Shandong University of Science and Technology)
41	16:20-16:40	A New Variational Adaptive Intermittent Filtering in Complex Noise with Unknown Measurement Loss Applied to Underwater Vehicle	Haoqian Huang*, Shuang Zhang, Jiaying Wei, Jiacheng Tang (Hohai University)
13	16:40-17:00	Distributed Average Tracking of Heterogeneous Multi-agent Systems via Event-triggered Strategies	Chengxin Xian, Yu Zhao* (Northwestern Polytechnical University)
62	17:00-17:20	A Network Structure Optimization Method for Key Place Air Defense System	Jianxing Gong, Peiyuan Ding*, Jiarui Zhang, Quan Liu, Yushan Guan (National University of Defense Technology)

Poster Group

Sunday, April 24, 2022, 9:00-17:00, Tencent Meeting: 390 390 224
Chair: Qi Liu (Northwestern Polytechnical University)
Co-Chair: Pingping Xie (Northwestern Polytechnical University)

Paper ID	Title	Author

70	Forecast of the Industry Development as a Large System	Oleg Dranko*, Alexander Rezchikov (Russia) (Trapeznikov Institute of Control Sciences)
9	A New Model Reduction Method for the Approximation of Large-scale Systems	Arvind Kumar Prajapati*, Sugunakar Mamidala, Sai Ganesh Muni, Rajendra Prasad (India) (VIT AP University)
73	NN-based Supplementary Control with Dynamic ETM under DoS Attacks	Xueli Wang, Derui Ding*, Guoliang Wei, Shangwei Zhao (University of Shanghai for Science and Technology)
43	H-infinity Asynchronous Control for Discrete-time Semi-markov Jump Systems	Liqiang Jin, Yanyan Yin*, Yanqing Liu, Kok Lay Teo, Fei Liu (Australia) (Jiangnan University)
21	Dynamic Output Feedback Control for Networked Control Systems: A Sum-based Discrete Event-triggered Approach	Duo Zhang, Liruo Zhang*, Zhiyong Yu, Hongfei Li, Lan Shu (University of Electronic Science and Technology of China)
42	An Auto-MILP Model for Flexible Job Shop Scheduling Problem	Liping Huang*, Rong Su (Nanyang Technological University)
35	A Mathematical Model for Choosing an Action Plan for the Prevention and Elimination of Flood Effects	Maria Khamutova, Vadim Kushnikov, Oleg Dranko* (Russia) (Trapeznikov Institute of Control Sciences)
07	Vision-based Autonomous Landing Control of a Multi-rotor Aerial Vehicle on a Moving Platform with Experimental Validations	Zehong Zhao*, Peng Han, Yifeng Xu, Wei Xie, Weidong Zhang, Kejing Liang, Qing Zeng

		(Shanghai Jiao Tong University)
66	Fault Diagnosis of Aero Engine Control System Based on Honey Badger Optimizer	Yingxue Chen, Linfeng Gou*, Huihui Li, Jiayi Wang (Northwestern Polytechnical University)