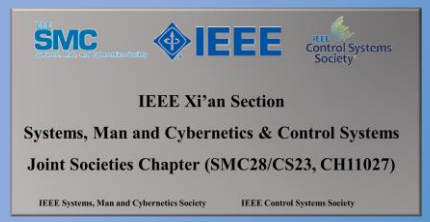
IEEE Systems, Man, and Cybernetics Society Frontier Academic Forum

Organizers:
IEEE SMC and CS Xi’an Section Joint Chapter
Xi’an Jiaotong University
Co-Organizers:
IEEE SMC and RA Beijing Section Joint Chapter
Chongqing University

Frontier Academic Forum

Organizer



In order to better promote the development of talents and technologies in the field of control and safety in Xi'an area, approved by IEEE Headquarters in 2022, the IEEE Xi'an Section, Systems, Man, and Cybernetics and Control Systems Joint Societies Chapter was established under the chairmanship of Prof. Chao Shen of Xi'an Jiaotong University. Chapter organizes dozens of academic conferences and forums of various scales and levels every year around the cutting-edge theories of control and safety of intelligent systems, starting from the hot and difficult issues in the fields of Artificial Intelligence, Multi-intelligent Body Systems, Intelligent Robotics and so on, respectively, so as to lay the foundation of the development of the theories of control and safety of intelligent systems and to cultivate the newborn talents.

Notes on the Forum

Workshop Date

-December 27, 2023

Workshop Venue

-Online： Zoom: 825 5451 3905
PIN: 632012
Link:https://us06web.zoom.us/j/82554513905?pwd=yC6PiqUjFP6FpAQNHbdL5dmtmSpwrJ.1

Participants

- Invited scholars
- Graduate Students of Xian Jiaotong University
- Graduate Students of Chongqing University

Forum Schedule

	Time (Beijing Time Zone)	Topic	Host
1	15:00-15:05 (17:30-17:35, Australia, Adelaide)	Opening	Peng Shi
2	15:05-15:35 (7:05-7:35, UK, London)	Fuzzy-Model-Based Control - Breakthroughs and Potential Research **Hak Keung Lam**	Chao Shen
	Break		
3	20:05-20:35 (20:05-20:35, China, Guangzhou)	Smart Energy for Sustainability – The Microgrid **Loi Lei Lai**	Chao Shen
4	20:35-21:05 (13:35-14:05, Spain, Granada)	Trustworthy Artificial Intelligence: From a Theoretical Perspective to a Practical Perspective **Enrique Herrera-Viedma**	Chao Shen
	Break		
5	21:35-22:05 (7:35-8:05, America, Tennessee)	Large-Scale Networks and Phase Transitions: Models and Applications in Biological and Engineering System **Robert Kozma**	Chao Shen
6	22:05-22:10 (00:35-00:40, 28th Dec, Australia, Adelaide)	Closing	Peng Shi Chao Shen Xiaojie Su

Forum Participants

Keynote Speakers

Hak Keung Lam	King's College London	Professor
Loi Lei Lai	Guangdong University of Technology	Professor
Enrique Herrera-Viedma	University of Granada	Professor
Robert Kozma	University of Memphis	Professor

Organizing Committee

Peng Shi, Chair	University of Adelaide	Professor
Chao Shen, Chair	Xi'an Jiaotong University	Professor
Xiaojie Su, Chair	Chongqing University	Professor
Chenhao Lin	Xi'an Jiaotong University	Professor
Chong Zhang	Xi'an Jiaotong University	Lecturer
Yutong Liu	Chongqing University	Lecturer

Hak Keung Lam
King's College London

Fuzzy-Model-Based Control - Breakthroughs and Potential Research

Biography

Hak Keung Lam

Hak Keung Lam's research interests include control theory, intelligent systems, computational intelligence, machine learning and their applications. He has authored/co-authored over 480 publications (as of 2023) on these topics.He serves as an area editor/guest editor/editorial board member for a number of journals, a program committee member, an international advisory board member, an invited session chair, publication chair and programme chair for various international conferences, and a reviewer for various books, international journals and international conferences. He has organised a number of special sessions for international conferences.He was an associate editor for IEEE Transactions on Circuits and Systems II: Express Briefs and is an associate editor for IEEE Transactions on Fuzzy Systems, IET control Theory and Applications, International Journal of Fuzzy Systems, Neurocomputing and Nonlinear Dynamics. He is a co-editor for two edited volumes: Control of Chaotic Nonlinear Circuits (World Scientific, 2009) and Computational Intelligence and Its Applications (World Scientific, 2012), and the author/co-author of the books Stability Analysis of Fuzzy-Model-Based Control Systems (Springer, 2011), Polynomial Fuzzy Model Based Control Systems (Springer 2016), Interval Type-2 Fuzzy-Model-Based Systems (Springer, 2016). He is an IEEE Fellow for contributions to analysis and design of fuzzy model-based control systems. He has been named a Highly Cited Researcher (Clarivate Web of Science) since 2018.

Abstract

This talk gives an overview of "Fuzzy-Model-Based Control: Breakthroughs and Potential Research." It avoids complex math but introduces Fuzzy-Model-Based Control in a simple way, highlighting recent breakthroughs. The presentation covers the basic concepts, discussing challenges and how to apply the theory in real-world situations. It ends by exploring future research areas, encouraging the audience to think about the future of fuzzy-model-based control. Attendees will leave with a basic understanding of concepts, challenges and opportunities for further exploration.

Loi Lei Lai
Guangdong University of Technology

Smart Energy for Sustainability – The Microgrid

Biography

Loi Lei Lai

Loi Lei Lai received the B.Sc. (First Class Hons.), Ph.D., and D.Sc. degrees in electrical and electronic engineering from the University of Aston, Birmingham, UK, and City, University of London, London, UK, in 1980, 1984, and 2005, respectively. Professor Lai is currently President of DRPT International Incorporated, a not-for-profit organization registered in Australia. He is also a University Distinguished Professor with Guangdong University of Technology, Guangzhou, China, a Pao Yue Kong Chair Professor with Zhejiang University, Hangzhou, China, and Professor and Chair of Electrical Engineering with City, University of London. His current research areas are in smart cities and smart grid. Professor Lai was awarded an IEEE Third Millennium Medal, the IEEE Power and Energy Society (IEEE/PES) UKRI Power Chapter Outstanding Engineer Award in 2000, the IEEE/PES Energy Development and Power Generation Committee Prize Paper in 2006 and 2009, the IEEE Systems, Man, and Cybernetics Society (IEEE/SMCS) Outstanding Contribution Award in 2013 and 2014, the Most Active Technical Committee Award in 2016, and his research team has received a Best Paper Award in the IEEE International Smart Cities Conference in October 2020. Professor Lai is an Associate Editor of the IEEE Transactions on Systems, Man, and Cybernetics: Systems, Editor-in-Chief of the IEEE Smart Cities Newsletter, a member of the IEEE Smart Cities Steering Committee and the Chair of IEEE/SMCS Standards Committee. He was a member of the IEEE Smart Grid Steering Committee; the Director of Research and Development Center, State Grid Energy Research Institute, China; a Vice President for Membership and Student Activities of IEEE/SMCS; and a Fellow Committee Evaluator and Distinguished Lecturer for the IEEE Industrial Electronics Society. He is an IET Fellow.

Abstract

This keynote will give some examples to share the smart energy research and development for promoting sustainability and adopting renewables. Importance of standards development will be discussed and some current international standards in this area will be given.

Enrique Herrera Viedma
University of Granada

Trustworthy Artificial Intelligence: From a Theoretical perspective to a Practical perspective

Biography

Enrique Herrera-Viedma is Professor in Computer Science and Artificial Intelligence in University of Granada (UGR) and currently, Vice - President for Research and Knowlegde Transfer. His current research interests include intelligent decision support systems, linguistic modeling, information retrieval, bibliometrics, digital libraries, web quality evaluation, recommender systems, blockchain, social media, big data, and Trustworthy AI systems. In these topics he has published more than 380 papers in ISI journals, coordinated more than 25 research projects, and received more than 50.000 citations according to Web of Science, being his h-index 95 and 111 in Google Scholar. Dr. Herrera-Viedma is Fellow IEEE, Fellow IFSA, member of Academia Europeana, Doctor Honoris Causa in Oradea University. He was Vice-President for Publications and now he is VP Cybernetics in IEEE System, Man, and Cybernetics Society and an Associate Editor of prestigious international journals such as the IEEE Trans. On Syst. Man, and Cyb.: Systems, IEEE Trans. On Fuzzy Systems, IEEE Trans. On Cybernetics, Knowledge Based Systems, Soft Computing, Fuzzy Optimization and Decision Making, Applied Soft Computing, Journal of Intelligent and Fuzzy Systems, and Information Sciences.

Enrique Herrera-Viedma

Abstract

Trustworthy Artificial Intelligence (AI) is based on seven technical requirements sustained over three main pillars that should be met throughout the system's entire life cycle: it should be (1) lawful, (2) ethical, and (3) robust, both from a technical and a social perspective. However, attaining truly trustworthy AI concerns a wider vision that comprises the trustworthiness of all processes and actors that are part of the system's life cycle, and considers previous aspects from different lenses. A more holistic vision contemplates four essential axes: the global principles for ethical use and development of AI systems, a philosophical take on AI ethics, a risk-based approach to AI regulation, and the mentioned pillars and requirements.The seven requirements (human agency and oversight; robustness and safety; privacy and data governance; transparency; diversity, non-discrimination and fairness; societal and environmental wellbeing; and accountability) are analyzed from a triple perspective: What each requirement for trustworthy AI is, Why it is needed, and How each requirement can be implemented in practice. On the other hand, a practical approach to implement trustworthy AI systems allows defining the concept of responsibility of AI systems facing the law, through a given auditing process.Therefore, a responsible AI system is the resulting notion we introduce in this work, and a concept of utmost necessity that can be realized through auditing processes, subject to the challenges posed by the use of regulatory sandboxes. Our multidisciplinary vision of trustworthy AI also includes a regulation debate, with the purpose of serving as a entry point to this crucial field in the present and future progress of our society

Robert Kozma
University of Memphis

Large - Scale Networks and Phase Transitions: Models and Applications in Biological and Engineering System

Biography

Robert Kozma (Fellow IEEE, Fellow INNS) holds 2 M.Sc. degrees, in Power Engineering (Moscow, USSR), and Mathematics (Budapest, Hungary); Ph.D. in Applied Physics (1992) from Delft University of Technology, The Netherlands. He has held faculty positions at the University of California at Berkeley, USA; Otago University, Dunedin, New Zealand; Tohoku University, Sendai, Japan. He has been Professor of Computer Science and Mathematics at University of Memphis since 2000, where he is the founding Director of the Center for Large-Scale Intelligent Optimization & Networks. Past affiliations with US Air Force Research Laboratory; NASA Jet Propulsion Lab; Lawrence Berkeley Lab; Sarnoff Co., Princeton; U. Massachusetts, Amherst. His research focuses on design, analysis, and control of artificially and biologically intelligent systems, robust decision support systems, authored/edited 9 book volumes, over 300 papers, and 3 patents. Dr. Kozma has been the President of the International Neural Network Society (INNS), served on the Board of Governors (BOG) of the IEEE Systems, Man, and Cybernetics Society, the AdCom of IEEE Computational Intelligence Society, and BOG of INNS. He is EIC of IEEE Transactions on SMC: Systems.

Robert Kozma

Abstract

Large - scale random graphs have been studied extensively in recent decades and produced breakthrough results in a wide range of applications, including engineering, biological, and social systems. We introduce some fundamental results of network theory, Erdos - Renyi, Barabasi - Albert, Strogatz - Watts, scale - free systems with Black Swan statistics, as well as Dragon Kings. The statistical properties and behavior of these networks are typically assumed to be unpredictable. New developments in large - scale networks theory involving critical behaviors provide the window to predict and statistically analyze these processes. Various methods have been developed to control the oscillatory network dynamics between states with and without large - scale synchrony. We describe applications in biological and cognitive systems, autonomous robot control, highly flexible and rapidly reconfigurable distributed sensor networks, and robust decision - making.

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