

The 2nd IEEE International Summer School on E-CARGO and Applications

Guangzhou, China (Hybrid), July 22, 2024- July 26, 2024

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Final Program

July 22, 2024-July 26, 2024 (Beijing Time):

Beijing Time	Day				
	1	2	3	4	5
8:30am-9:20am	Open Ceremony: 8:15-8:30am Keynote speech 1: Sam Kwong Chair: Haibin Zhu	Keynote speech: Weiming Shen Chair: Dongning Liu	Keynote speech: Robert Kozma Chair: Libo Zhang	Lecture 6: Group Role Assignment in Higher-order Set Collaboration (Dongning Liu)	Questions and Answers
9:20am-9:30am	Break	Break	Break	Break	Break
9:30am-11:30am	Lecture 1 (10:00-11:50am): E-CARGO and Role-Based Collaboration (Haibin Zhu)	Lecture 3: Social Simulation using E-CARGO (Haibin Zhu)	Questions and Answers (9:30-10:30am) Keynote speech (10:30am-11:15am): Philip Chen Chair: Libo Zhang	Lab 2: Group Multi-Role Assignment (GMRA) (Qian Jiang)	Lecture 8: E-CARGO/RBC and My Journey to PhD
11:30am-2:30am	Lunch and Break	Lunch and Break	Lunch and Break	Lunch and Break	Lunch and Break
2:30pm-3:20pm	Keynote speech 2: Loi Lei Lai Chair: Haibin Zhu	Keynote speech: Ljiljana Trajkovic Chair: Dongning Liu	Lecture 4: E-CARGO Applications in Service/Cloud Computing (Hua Ma)	Keynote speech: Yong Tang Chair: Yin Sheng	Keynote speech: Peng Shi Chair: Haibin Zhu
3:20pm-3:30pm	Break	Break	Break	Break	Break
3:30pm-5:30pm	Lecture 2: Group Role Assignment with Constraints (Haibin Zhu)	Lab 1: Group Role Assignment (GRA) (Qian Jiang)	Lecture 5: E-CARGO Applications in Management (Libo Zhang)	Lecture 7: Adaptive Collaboration (Yin Sheng)	Lab 3: Student Presentations and Closing Ceremony

Keynote speech 1: Sam Kwong, Professor, Lingnan University, Hong Kong, China, IEEE Fellow

Time: 8:30am – 9:15am Monday July 22, 2024 (Onsite)

Title: Creating a Better Future: Harnessing AI for Social and Environmental Responsibility

Abstract:

In this talk, I will explore the potential of artificial intelligence (AI) to address some of the most pressing social and environmental challenges facing our world today. With its ability to analyze vast amounts of data, identify patterns, and make predictions, AI has the potential to revolutionize fields such as healthcare, education, and climate science.

However, as AI becomes more powerful and ubiquitous, it is also raising important ethical and social questions. How can we ensure that AI is used for the greater good, rather than

contributing to inequality and injustice? How can we ensure that the benefits of AI are shared fairly across society, rather than concentrated among a small group of wealthy individuals and corporations?

In this talk, the speaker will delve into various questions related to AI applications and their positive impact on society and the environment. The talk will draw on examples of specific AI applications that are already making a difference. For instance, the underwater instance segmentation, which is the process of detecting and segmenting objects in underwater images. This technology has the potential to improve underwater exploration, marine conservation, and disaster response efforts.

Another example is image reconstruction based on compressive sensing. This technique allows for the reconstruction of high-quality images from a limited amount of data, which can be particularly useful in applications such as medical imaging or remote sensing. The third topic is the low night

image enhancement, which is a technology that enhances images taken in low-light conditions. This can improve the accuracy and effectiveness of applications such as surveillance, transportation safety, and security.

By exploring these and other examples of AI applications, the talk aims to demonstrate the potential of AI to make a positive impact on society and the environment, and to inspire further innovation in

Ultimately, this talk will aim to inspire and empower attendees to think critically about the role of AI in shaping our future, and to explore ways in which they can harness this powerful technology to create a more just, equitable, and sustainable world.

Keynote speech 2: Loi Lei Lai, Chairman, DRPT International Incorporated, Australia, IEEE Fellow

Time: 2:30pm-3:15pm Monday July 22, 2024 (Online)

Title: Smart Cities for Sustainability

Abstract:

This talk covers a few important topics from smart cities such as smart energy, smart transportation, smart health, and standards development to promote sustainability. To achieve net-zero emissions by 2050/2060, preserve biodiversity and mitigate global warming, people need to promote sustainability and adopt renewables. Smart energy with advanced control and management approaches will play a key role in a carbon-neutral society. Power system operation, control and management could be enhanced with the introduction of batteries such as those from electric vehicles. Major environmental, economic, and technological challenges for example climate change, economic restructuring, pressure on public finances, digitalization of the retail and entertainment industries, and growth of urban and ageing populations have generated huge interest for cities to be run smartly. Some current international research and development activities will be reported, importance of standards development and future directions will be discussed.

Keynote speech 3: Weiming Shen, Professor, Huazhong University of Science and Technology, China, IEEE Fellow

Time: 8:30am – 9:15am Tuesday July 23, 2024

Title: Industrial Foundation Models and their Potential Applications in Intelligent Manufacturing

Abstract:

Foundation models or large language models have become the most popular topic in artificial intelligence research today, but their applications in the industrial field are still in their early stages. This lecture briefly introduces the basic concepts, core technologies, and development status of industrial foundation models; explores the potential applications of industrial foundation models in intelligent manufacturing, their advantages and limitations; presents our own experience and understanding of practical applications; and discusses the relevant risks and potential challenges during the development and deployment of industrial foundation models in intelligent manufacturing.

Keynote speech 4: Liljana Trajkovic, Professor, Simon Fraser University, Canada, IEEE Fellow

Time: 2:30pm-3:15pm Tuesday July 23, 2024 (Online)

Title: Data Mining and Machine Learning for Analysis of Network Traffic

Abstract:

Collection and analysis of data from deployed networks is essential for understanding modern communication networks. Data mining and statistical analysis of network data are often employed to determine traffic loads, analyze patterns of users' behavior, and predict future network traffic while various machine learning techniques proved valuable for predicting anomalous traffic behavior. In described case studies, traffic traces collected from various deployed networks and the Internet are used to characterize and model network traffic, analyze Internet topologies, and classify network anomalies. Deep learning, broad learning, gradient boosting decision tree, and reservoir computing algorithms are evaluated by developing models based on collected datasets that contain Internet worms, power outages, and ransomware events.

Keynote speech 5: Robert Kozma, Professor, University of Memphis, Memphis, USA, IEEE Fellow

Time: 8:30am – 9:15am Wednesday July 24, 2024 (Online)

Title: Dynamic Aspects of Role-Based Collaborations in AI Systems - A Cognitive Neuroscience Perspective

Abstract:

Recent advances in Artificial General Intelligence (AGI) have been at the center of cutting-edge research and development efforts and they attracted immense attention worldwide. AGI systems often demonstrate super-human performance over a wide range of tasks, which has been welcomed in many applications, but also raised worries in large segments of the populations. Human-centered development of artificial intelligence tools can provide crucial support to answer the challenges ahead.

This talk introduces several leading concepts of cognition and consciousness, to support building artificially intelligent systems which manifest productive collaboration of humans and machines. Significant efforts have been made in recent years to identify neural correlates of consciousness. Key concepts include self-organized criticality, neural avalanches, phase transitions, and scale-free structures, and large-scale synchronization dynamics. We expand on the Global Workspace Theory (GWT) of consciousness, which has been a leading theory of scientific studies of consciousness since the late 20th century. GWT invokes the "theater metaphor" of role playing to illustrate conscious experience as the interaction of populations of agents. In this metaphor, the agents interact at first in a less-organized way, also called "pandemonium" state. At a certain time of "ignition", some of the agents, or a coalition of agents, takes a leading role, jumps to the stage and attracts the spotlight. Consciousness corresponds to the bright spot on the stage, which attracts the attention of all agents, and the conscious content rapidly propagate across the theater involving all agents. The conscious perceptual and cognitive content is shaped by selective attention, huge amount of unconscious knowledge, and unconscious contexts.

We describe practical implementations of the GWT to develop artificially intelligent systems which reflect key aspects of human cognition. We conclude with discussions on future trends of human-friendly AGI.

Keynote speech 6: Philip Chen, Dean and Professor, South China University of Science and Technology, China, IEEE Fellow

Time: 10:30am-11:15am Wednesday July 24, 2024

Title: On the Explainability of Fuzzy Broad Learning (Neuro) Systems (FBLS): Analysis on the Tradeoff between Accuracy and Complexity

Abstract: The fuzzy broad learning system (FBLS) is a recently proposed neuro-fuzzy model that shares the similar structure of a broad learning system (BLS). It shows high accuracy in both classification and regression tasks and inherits the fast computational

nature of a BLS. However, the ensemble of several fuzzy subsystems in an FBLS decreases the possibility of understanding the fuzzy model since the fuzzy rules from different fuzzy systems are difficult to combine together while keeping the consistence.

To balance the model accuracy and complexity, this talk is to discuss a synthetically simplified FBLS with better interpretability, named compact FBLS (CFBLS), which can generate much

fewer and more explainable fuzzy rules for understanding. In such a way, only one traditional Takagi–Sugeno–Kang fuzzy system is employed in the feature layer of a CFBLs, and the input universe of discourse is equally partitioned to obtain the fuzzy sets with proper linguistic labels accordingly. The random feature selection matrix and rule combination matrix are employed to reduce the total number of fuzzy rules and to avoid the “curse of dimensionality.” The experiments on the popular datasets indicate that the CFBLs can generate a smaller set of comprehensible fuzzy rules and achieve much higher accuracy than some state-of-the-art neuro-fuzzy models. Moreover, the advantage of CFBLs is also verified in a real-world application.

Keynote speech 7: Peng Shi, Professor, University of Adelaide, Australia, IEEE Fellow

Time: 2:30pm-3:15pm Friday July 26, 2024 (Online)

Title: Hybrid attacks design on cyber-physical systems

Abstract:

Cyber-physical systems (CPS), such as smart grids and intelligent transportation systems, are complex systems where software and hardware components are seamlessly integrated towards performing well-defined tasks. However, this integration increases the vulnerability of CPS with more chances/higher possibility of cyber-attack that could cause severe consequences to economics, society, and human beings. Hence, cyber-security is a critical and important issue to be addressed in CPS. In this talk, the security of CPS is discussed from the perspectives of attackers. We will introduce the background of CPS and security issues, and some existing work on cyber-attacks. We then present our recent work on the design of stealthy hybrid attacks to CPS, which enables attackers to launch hybrid cyber-attacks more effectively to maximize system performance degradation with less chance to be detected. In turn, the attack strategies proposed would challenge the defenders to develop more effective, efficient and resilient methodologies to possibly detect hackers’ intrusions, and maintain the systems operating in a secure, reliable and desired mode.

Keynote speech 8: Yong Tang, Professor, South China Normal University, China, Creator of scholat.com

Time: 2:30pm-3:15pm Thursday July 25, 2024 (Onsite)

Title: Cooperative Intelligent Applications based on SCHOLAT

Abstract:

Social networks are changing our daily lives. In order to meet the needs of research and teaching, we designed a social network named SCHOLAT, which provides a platform for scholars to cooperate in research and teaching. In this talk, I will briefly introduce the usage of SCHOLAT through real examples, analysis the big data in SCHOLAT, and propose an application mode of SCHOLAT+. Finally, I'll introduce several applications based on SCHOLAT.