Department of Computer Science
香港城市大學
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COMPUTER SCIENCE COLLOQUIUM

E-CARGO/RBC: Enabling Research Innovations in the Era of AI

SPEAKER **Prof. Haibin Zhu**

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VENUE CS Seminar Room, Y6405, 6th Floor, Yellow Zone, Yeung Kin Man Academic Building, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong

ABSTRACT

In the AI (Artificial Intelligence) time, many AI tools, such as LLMs (Large Language Models), can help people accomplish many low-level intelligent tasks, such as coding and reporting. Many low-level routine jobs have high potential to be replaced by such LLMs. Traditional programmers need to master powerful high-level modelling tools to meet these new challenges. E-CARGO/RBC (Environments - Classes, Agents, Roles, Groups, and Objects /Role-Based Collaboration) is a modelling methodology, which helps people deal with complex problems by designing systematic strategies other than using low level programming skills. RBC is a computational methodology that uses roles as the primary underlying mechanism to facilitate collaboration activities. It consists of a set of concepts, principles, models, processes, and algorithms. RBC and its E-CARGO model have been developed to a powerful tool for investigating collaboration and complex systems. Related research has brought and will bring in exciting improvements to the development, evaluation, and management of systems including collaboration, services, clouds, productions, and administration systems. RBC and E-CARGO grow gradually into a strong fundamental methodology and model for exploring solutions to problems of complex systems including Collective Intelligence, Social Networking, Scheduling, Smart Cities, Internet of Things, Cyber-Physical Systems, and Social Simulation Systems. E-CARGO assists scientists and engineering to formalize abstract problems, which originally are taken as complex problems, and finally points out solutions to such problems including programming. The E-CARGO model possesses all the preferred properties of a computational model. It has been verified by formalizing and solving significant problems in collaboration and complex systems, e.g., Group Role Assignment (GRA). With the help of E-CARGO, the methodology of RBC can be applied to solve various real-world problems. E-CARGO itself can be extended to formalize abstract problems as innovative investigations in research. On the other hand, the details of E-CARGO components are still open for renovations for specific fields to make the model easily applied. For example, in programming, we need to specify the primitive elements for each component of E-CARGO. When these primitive elements are well-specified, a new type of modelling/programming language can be developed and applied to solve general problems with software design and implementations. In this talk, the speaker examines the requirement of research on collaboration systems and technologies, discusses RBC and its model E-CARGO; reviews the related research achievements on RBC and E-CARGO in the past years; illustrates those problems that have not yet been solved satisfactorily; presents the fundamental methods to conduct research related to RBC and E-CRAGO and discover related problems; and analyzes their connections with other cutting-edge fields. This talk aims to inform the audience that E-CARGO is a well-developed model and has been investigated and applied in many ways. The speaker welcomes queries, reviews, studies, applications, and criticisms.

BIOGRAPHY

Dr. Haibin Zhu is a Full Professor and the Coordinator of the Computer Science Program, the Founding Director of the Collaborative Systems Laboratory, a member of Arts and Science Executive Committee, Nipissing University, Canada. He is an affiliate professor of Concordia Univ. and an adjunct professor of Laurentian Univ., Canada. He received his PhD degree in computer science from the National Univ. of Defense Tech. (NUDT), China. He was the chair of the Department of Computer Science and Mathematics, Nipissing University, Canada (2019-2021), a visiting professor and special lecturer in the College of Computing Sciences, New Jersey Institute of Technology, USA (1999-2002) and a lecturer, an associate professor and a full professor at NUDT (1988-2000). He has accomplished (published or in press) over 350+ research works including 70+ IEEE Transactions articles, six books, five book chapters, four journal issues, and four conference proceedings. He is a Fellow of IEEE and I2CICC (International Institute of Cognitive Informatics and Cognitive Computing), a Senior Member of ACM, a Full Member of Sigma Xi, and a Life Member of CAST-USA (Chinese Association of Science and Technology, USA). He is serving as Vice President, Systems Science and Engineering (SSE) (2023-), a member-at-large of the Board of Governors (2022), and a co-chair (2006-) of the technical committee of Distributed Intelligent Systems of IEEE Systems, Man and Cybernetics (SMC) Society (SMCS), SMCS Primary Representative, IEEE Systems Council. Associate Editor (AE) of IEEE Systems Journal (2024-), IEEE Transactions on Computational Social

Systems(2018-), Frontiers of Computer Science (2021-), and IEEE Canada Review (2017-). He was He served as Editor-in-Chief of IEEE SMC Magazine (2022), AE of IEEE Transactions on SMC: Systems (2018-2026), AE of IEEE SMC Magazine (2015-2021), Associate Vice President (AVP), SSE (2021), IEEE SMCS, a Conference (Co-)Chair and Program (Co-)Chair for many international conferences, and a PC member for 150+ academic conferences. He is the founding researcher of Role-Based Collaboration and the creator of the E-CARGO model. His research monograph E-CARGO and Role-Based Collaboration can be found on amozon.ca. The accompanying codes can be downloaded from GitHub: https://github.com/haibinnipissing/E-CARGO-Codes. He has offered 40+ keynote and plenary speeches for international conferences and 90+ invited talks internationally. He has been granted more than $1M CAD from SSHRC, NSERC, IBM, DNDC, DRDC, and OPIC. He was listed as "Most Influential Robotics Trailblazers, Making Wave in The Industry – 2024", InsightsSuccess Magazine. He was the recipient of the best paper award from the 28th Int'l conf. on CSCWD, Compiegne, France, 2025, the best paper award in international collaboration from the 25th Int'l conf. on CSCWD, Hangzhou, China, 2022, the meritorious service award from IEEE SMC Society (2018), the chancellor's award for excellence in research (2011) and two research achievement awards from Nipissing University (2006, 2012), the IBM Eclipse Innovation Grant Awards (2004, 2005), the Best Paper Award from the 11th ISPE Int'l Conf. on Concurrent Engineering (ISPE/CE2004), the Educator's Fellowship of OOPSLA'03, a 2nd class National Award for Education Achievement (1997), and three 1st Class Ministerial Research Achievement Awards from China (1997, 1994, and 1991). His research interests include Collaboration/Complex Systems, Human-Machine Systems, Computational Social Systems, Social/Team Intelligence, Multi-Agent Systems, Software Engineering, and Distributed Intelligent Systems.

All are welcome!

In case of questions, please contact Prof. ZHANG Qingfu at qingfu.zhang@cityu.edu.hk, or visit the CS Departmental Seminar Web at https://www.cs.cityu.edu.hk/events/cs-seminars/recent-cs-colloquiums.