Dynamic Event-Triggered Distributed Coordination Control and Its Applications

Distinguished Professor Qing-Long Han, FIEEE, FIEAust

Pro Vice-Chancellor (Research Quality) Swinburne University of Technology Melbourne, Vic 3122, Australia Tel.: +613 9214 3808 Email: qhan@swin.edu.au

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.

Bio of Professor Qing-Long Han



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 Laboratoire d'Auomatique et d'Informatique Industrielle (LAII) (currently, Laboratoire d'Informatique et d'Automatique pour les Systèmes, LIAS), École Supérieure d'Ingénieurs de Poitiers (ESIP) (currently, École Nationale Supérieure d'Ingénieurs de Poitiers (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.

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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, ranked 2020. Professor Han has been 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.