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The Department of Automatic Control & Systems Engineering
is pleased to announce the following seminar:

General Type-2 Fuzzy Logic Systems: Towards Higher Order Fuzzy Logic Systems to Handle the Uncertainties in Real World Applications

Professor Hani Hagra

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University of Essex*

Wednesday, 1 October 2014 at 14:00

LT02, Sir Henry Stephenson Building

Abstract

Most real world applications face high levels of uncertainties that can affect the operations of such applications. Hence, there is a need to develop different approaches that can handle the available uncertainties and reduce their effects on the given application. To date, Type-1 Fuzzy Logic Systems (FLSs) have been applied with great success to many different real world applications. The traditional type-1 FLS which uses crisp type-1 fuzzy sets cannot handle high levels of uncertainties appropriately. Nevertheless, it has been shown that higher order FLSs such as general type-2 FLSs can handle such uncertainties better and thus produce a better performance. However, the immense computational complexities associated with general type-2 FLSs have until recently prevented their application to real world control problems. This talk will explain the concepts of interval and general type-2 FLSs and will present a new framework to design general type-2 FLS. The proposed approach will lead to a significant reduction in both the complexity and the computational requirements for general type-2 FLSs while offering the capability of representing complex general type-2 fuzzy sets. This talk will explain how the proposed approach can present a way forward for fuzzy systems in real world environments and applications that face high levels of uncertainties. The talk will also present the successful application of type-2 FLSs to many real world settings.

Biography

Prof. Hani Hagra is a Professor of Computational Intelligence, Director of the Computational Intelligence Centre, Head of the Fuzzy Systems Research Group and Head of the Intelligent Environments Research Group in the University of Essex, UK. He is a Fellow of Institute of Electrical and Electronics Engineers (IEEE) and he is also a Fellow of the Institution of Engineering and Technology (IET). His major research interests are in computational intelligence, notably type-2 fuzzy systems, fuzzy logic, neural networks, genetic algorithms, and evolutionary computation. His research interests also include ambient intelligence, pervasive computing and intelligent buildings. He is also interested in embedded agents, robotics and intelligent control.

His research has won numerous prestigious international awards where most recently he was awarded by the IEEE Computational Intelligence Society (CIS), the 2013 Outstanding Paper Award in the IEEE Transactions on Fuzzy Systems and also he has won the 2004 Outstanding Paper Award in the IEEE Transactions on Fuzzy Systems.

Prof Hagra chaired several international conferences where most recently he served as the Co-Chair of the 2013, 2011 and 2009 IEEE Symposium on Intelligent Agents, and the 2011 IEEE International Symposium on Advances to Type-2 Fuzzy Logic Systems. He was also the General Co-Chair of the 2007 IEEE International Conference on Fuzzy systems London.