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Biography

Qianchuan Zhao received the B.E. degree in automatic control in July 1992, the B.S. degree in applied mathematics in July 1992, and MS and Ph.D. degrees in control theory and its applications in July 1996, all from Tsinghua University, Beijing, China. He is currently a Professor and Director of the Center for Intelligent and Networked Systems (CFINS) <http://cfins.au.tsinghua.edu.cn>, Department of Automation, Tsinghua University. He was a Visiting Scholar at Carnegie Mellon University (worked with Prof. Bruce Krogh), Pittsburgh, PA, and Harvard University, Cambridge, MA, in 2000 and 2002, respectively. He was a Visiting Professor at Cornell University, Ithaca, NY, in 2006. His current research focuses on the modeling, control and optimization of complex networked systems. He has published more than 80 research papers in peer-reviewed journals and conferences. He is a recipient of the 4th HO PAN QING YI best paper award in DEDS field in the year 2000, the 9th Guan Zhao-Zhi Award best paper award in the year 2003 and the 2005 UTRC Outstanding Achievement Award, 2009 national natural science second award of China and 2013 national natural science second award by Ministry of education in China. Dr. Zhao is an associate editor for the Journal of Optimization Theory and Applications, IEEE Transactions on Control of Network Systems, the IEEE Transactions on Automation Science and Engineering, an associate editor for the joint conference CDC-ECC'05 and International Program Committee member for WODES'04. He is a senior member of IEEE.

Title: Insect Intelligent Building (I²B): a peer to peer coordination framework

Abstract: Building automation is an important area in view of the growing threat of global warming to the sustainable development of human societies. While advanced information and computing technologies such as Internet of Things (IoT) have provided major opportunities to improve performances at low costs, effective operation of building systems under changing circumstances (e.g., occupancy, indoor and outdoor environments), however, is still extremely challenging. This is because various decisions often have to be made within limited time and under limited information and various constraints. Traditionally these problems are solved by using either heuristics for practical problems relying on experienced engineers or technicians, or by exhaustive numerical methods that work only for small-scale problems, or recently by data-driven machine learning methods that need a huge amount of training data. In this talk, we will describe a new paradigm called Insect Intelligent Building (I²B) that we introduced recently where building devices or space units are regarded as agents (called insects) with low level intelligence. We will demonstrate how these agents work together by only local

communication to accomplish high level building control and management tasks under various uncertain environments. Similar to many applications in other areas, our I2B is inspired by so called swarm intelligence and peer to peer coordination, but more suitable for the building control and management context. Several sample problems will be used to show the power of this simple idea. We will also report the implementation of the system in practice.