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Cyber - Physical systems: Reality, dreams, and fantasy

The integration of physical systems with networked sensing, computation networks and embedded control with actuation has led to the emergence of a new generation of engineered systems, the Cyber-Physical Systems (CPS). Such systems emphasize the link between cyber space and physical environment (i.e., time, space, and energy). CPS represents the next generation of complex engineering systems. They are large scale dynamic systems that offer significant processing power while interacting across communication networks. CPS will help to solve the grand challenges of our society, such as, aging population, limited resources, sustainability, environment, mobility, security, health care, etc. Applications of CPS cover a wide band of economic, medical, and entertainment sectors. It includes Transportation: Automobiles, avionics, unmanned vehicles and smart roads; Large Scale Critical Infrastructure: bridges, mega buildings, power grid, defense systems; Health Care: Medical devices, health management networks, telemedicine; Consumer Electronics: Video games, audio/video processing, and mobile communication. Building Cyber-Physical Systems is not a trivial task. The difficulty arises from the existing gap in modeling and computing of the physical and cyber environments. The design process requires new theories, models, and algorithms that unify both environments in one framework. None of the current state-of-the-art methods are able to overcome the challenges of developing the unified CPS design paradigm. Several of these issues will be discussed in this talk. Case studies of real world CPSs will be illustrated.

Biography

Magdy A Bayoumi is the Z.L. Loflin Eminent Scholar Endowed Chair Professor at The Center for Advanced Computer Studies (CACS), University of Louisiana at Lafayette (UL Lafayette). He was the Director of CACS, 1997 – 2013 and Department Head of the Computer Science Department, 2000-11. He has guided about 65 PhD and 175 Master students. He has published over 500 papers in related journals and conferences. He edited, co-edited and co-authored 10 books in his research interests. He has been Guest Editor (or Co-Guest Editor) of 10 Special Issues in VLSI Signal Processing, Learning on Silicon, Multimedia Architecture, Digital and Computational Video, and Perception-on-a-Chip. He is an IEEE fellow. He is the recipient of the 2009 IEEE Circuits and Systems Meritorious Service Award. He was the Vice President for Conferences, Vice President for Technical Activities, and a member of the Board of Governors and Executive Committee of CAS Society. He received the French Government Fellowship, University of Paris Orsay, 2003-2005 and 2009 and the United Nation Fellowship, Egypt, 2002-2003. He was a Visiting Professor at King Saud University. He was on the Governor's commission for developing a comprehensive energy policy for the State of Louisiana.

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