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KEYNOTE – ABSTRACT

Science of System Integration for Cyber-Physical Systems: The heterogeneous composition of computing, sensing, actuation, and communication components has enabled a class of systems known as Cyber-Physical Systems (CPS) that transforms the way that we interact with the physical world. Developing systematic methods for analysis, design, and integration of CPS is very challenging because of the inherent heterogeneity and complexity. These challenges drive the need for modeling and analyzing cross-domain interactions among physical and computational/networking domains and demands deep understanding of the effects of heterogeneous abstraction layers in the design flow. To address the challenges of CPS integration, significant progress needs to be made toward a new science and technology foundation that is model-based, precise, and predictable. This talk presents a theory of composition for heterogeneous systems focusing on stability. Specifically, a passivity-based design approach that decouples stability from timing uncertainties caused by networking and computation is presented. In addition, cross-domain abstractions that provide effective solution for model-based fully automated software synthesis and high-fidelity performance analysis are described. The design objectives are robotic and automotive CPS.

SPEAKER - BACKGROUND

Dr. Xenofon Koutsoukos, Associate Professor, Department of Electrical Engineering and Computer Science, Vanderbilt University

Xenofon Koutsoukos is an associate professor in the Department of Electrical Engineering and Computer Science at Vanderbilt University. He is also a senior research scientist in the Institute for Software Integrated Systems (ISIS). Before joining Vanderbilt, Dr. Koutsoukos was a member of research staff in the Xerox Palo Alto Research Center (PARC) (2000-2002), working in the embedded collaborative computing area. He received his diploma in Electrical and Computer Engineering from the National Technical University of Athens (NTUA), Greece in 1993. He received the M.Sc. in Electrical Engineering in January 1998, the M.Sc. in Applied Mathematics in May 1998 and the Ph.D. in Electrical Engineering in 2000 from the University of Notre Dame. His research work is in the area of cyber-physical systems with emphasis on model-based design, formal verification, resilient coordination and control, diagnosis and fault tolerance, and adaptive resource management. He has published numerous journal and conference papers and he is co-inventor of four US patents. He is the recipient of the NSF Career Award in 2004, the Excellence in Teaching Award in 2009 from the Vanderbilt University School of Engineering, and the 2011 Aeronautics Research Mission Directorate (ARMD) Associate Administrator (AA) Award in Technology and Innovation from NASA.