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**Colorado State University's
Information Science and Technology Center (ISTeC)
*presents a lecture and an open forum by***



Janos Sztipanovits

Joe B. Wyatt Distinguished University
Professor, and E Bronson Ingram
Distinguished Professor of Engineering,
Director, Institute for Software
Integrated Systems,
Vanderbilt University

**ISTeC Distinguished Lecture
in conjunction with the
Electrical and Computer Engineering Department and
Computer Science Department Seminar Series**

**“Cyber Physical Systems: The Need and
Agenda for Re-integrating Physical and
Information Sciences”**

Monday, October 29, 2012
Reception: 10:30 a.m.
Lecture: 11:00 – 12:00 noon
Location: Computer Science 130



“Challenge in the Design of Cyber Physical Systems”

Monday, October 29, 2012
Discussion Forum: 2 - 3:30 p.m.
Location: Computer Science 210

ABSTRACT

“Cyber Physical Systems: The Need and Agenda for Re-integrating Physical and Information Sciences”

Cyber-physical systems are engineered as networks of interacting physical and computational processes. Most modern products in major industrial sectors, such as automotive, avionics, medical devices or energy production and distribution already are or rapidly becoming CPS, driven by new requirements and competitive pressures. Science and technology advancements in the 20th century have produced methods and tools for designing computational and physical systems in isolation. However, these methods have proved to be inadequate in a large range of CPS, where computational and physical processes are so tightly integrated that it is not possible to identify whether behavioral characteristics are the result of computations (computer programs), physical laws, or both working together, and where functionality and salient system characteristics are emerging through the interaction of physical and computational objects.

The past fifteen years provided ample evidence that the separation of information science and physical science has created a divergence in scientific foundations and technologies that has become strongly limiting to progress in the design of CPS. For example, dominant abstractions in programming languages typically avoid the explicit representation of time and other aspects of physicality, lumping together all related physical design considerations as “non-functional” requirements (such as timing, power and reliability). On the physical side, although engineering increasingly relies on computer based implementations, systems science has developed and evolved abstractions that largely neglect salient properties of computing and communication platforms (such as scheduling, resource management, network delays) and considers those as secondary implementation issues. The resulting barrier between systems and computer science has kept the research communities apart - splitting education into isolated disciplines and resulting in compartmentalized design flows that ultimately lead to major difficulties and failures as complexity increases.

This talk will focus on model-based engineering that has the potential to make real change here. It offers opportunity for designing and relating abstraction layers across design concerns using domain specific modeling languages, allows the development of semantic foundations for composing heterogeneous models and modeling languages and provides foundations and tools for relating models through transformations. Model-based software, network, systems and control engineering creates opportunities for a new convergence between physical and information sciences.

SPEAKER BIOGRAPHY

Dr. Janos Sztipanovits is currently the Joe B. Wyatt Distinguished University Professor and the E. Bronson Ingram Distinguished Professor of Engineering at Vanderbilt University. He is founding director of the Institute for Software Integrated Systems (ISIS). His current research interest includes the foundation and applications of Model-Integrated Computing for the design of Cyber Physical Systems. His other research contributions include structurally adaptive systems, autonomous systems, design space exploration and systems-security co-design technology. He served as program manager and acting deputy director of DARPA/ITO between 1999 and 2002. He was founding chair of the ACM Special Interest Group on Embedded Software (SIGBED). Dr. Sztipanovits was elected Fellow of the IEEE in 2000 and external member of the Hungarian Academy of Sciences in 2010. He graduated (Summa Cum Laude) from the Technical University of Budapest in 1970 and received his doctorate from the Hungarian Academy of Sciences in 1980.

To arrange a meeting with the speaker, please contact **Dr Robert France** at france@cs.colostate.edu

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