

## Networks, Multicore, and Systems Evolution – Facing the timing beast

**Prof. Rolf Ernst**

*University of Braunschweig, Germany*

### **Keynote abstract**

Embedded systems rapidly grow in several dimensions. They grow in size, from local isolated networks with simple protocols to network hierarchies to large open heterogeneous networks with complex communication behaviour. They grow in performance, from simple microcontrollers to superscalar to multicore systems with many levels of memory hierarchy. And, they expand in the time dimension by moving from static system functions to open and evolutionary functions that change over time and require new design methods and autonomous system functions. All these development contribute to an ever increasing behavioural complexity with equally complex timing. Nevertheless, the fundamental requirements to reliability and performance predictability have stayed and even been enhanced. Embedded system technology has responded with new integration methods and software architectures supported by platform control methods using new service quality metrics, and with composable formal methods that scale with system size. The talk will give an overview on this exiting scientific field and will give practical examples.

### **About Prof. Rolf Ernst**

Rolf Ernst received a diploma in computer science and a Dr.-Ing. (with honors) in electrical engineering from the University of Erlangen-Nuremberg, Germany, in 81 and 87. After 2 years at Bell Laboratories, Allentown, PA, he joined the Technische Universität Braunschweig, Germany, where he chairs a university institute of 55 researchers and staff. He is a full professor and was Head of the Department of Electrical Engineering from 1999 to 2001.



His research activities include embedded system design and design automation. The activities are currently supported by the German “Deutsche Forschungsgemeinschaft”, by the German BMBF, by European programs, and by industrial contracts, such as from Intel, Thomson, Ford, Bosch, and Volkswagen. He gave numerous invited presentations and tutorials at major international events and contributed to seminars and summer schools in the areas of hardware/software co-design, embedded system architectures, and system modeling and verification.

He chaired major international events, such as the International Conference on Computer Aided Design of VLSI (ICCAD), or the Design Automation and Test in Europe (DATE) Conference and Exhibition, and was Chair of the European Design Automation Association (EDAA), which is the main sponsor of DATE. He is a founding member of the ACM Special Interest Group on Embedded System Design (SIGBED), and was a member of its first board of directors. He is a member and activity leader of the European Networks-of-Excellence Artist1 (real-time systems), Artist 2 (embedded systems), and ArtistDesign. He is an elected member (Fachkollegiat) and Deputy Spokesperson of the "Computer Science" review board of the German DFG. He is an advisor to the German Ministry of Economics and Technology for the high-tech entrepreneurship program EXIST ([www.exist.org](http://www.exist.org)).

He is an IEEE Fellow and served as an ACM-SIGDA Distinguished Lecturer. He is a member of the German Academy of Science and Engineering, acatech.

## Intelligent Mechatronics and Robotics

**Prof. Fumio Harashima**

*President of Tokyo Denki University, Japan*

**Satoshi Suzuki**

*Tokyo Denki University, Japan*

### **Keynote abstract**

Mechatronics is defined as "Synergetic Integration of Mechanics and Electronics". Recently computer and information technologies have accelerated mechatronics technology to be more and more intelligent. Thus,

intelligent mechatronics is a technology on how to give human psychology to mechanical system so that human and mechanical system could interact with each other.

The interaction between human and mechanical/computer system is still asymmetrical, because mechanical/computer system cannot understand human psychology well, although human can easily understand the computer way of thinking.

The goal of intelligent mechatronics is to achieve a symmetrical interaction between human and mechanical system. Intelligent mechatronics is a new discipline based on the integration of mechanical, electrical, information technology, human sciences including medicine, psychology, social science, and so forth.

In this presentation, the past and present status of intelligent mechatronics is reviewed and the future prospect is discussed.

### ***About Prof. Fumio Harashima***

Fumio Harashima received B.S., and M.S. and Ph.D. degrees all in Electrical Engineering from University of Tokyo in 1962, 1964 and 1967, respectively. He was employed as Associate Professor at Institute of Industrial Science, University of Tokyo in 1967, and had been Professor from 1980 through 1998. He was Director of the Institute from 1992 to 1995. He was President of Tokyo Metropolitan Institute of Technology since 1998 through 2002. He is currently Professor at Tokyo Denki University. Dr. Harashima served as President of Tokyo Denki University from June, 2004 through June 2008.



He is Professor Emeritus of University of Tokyo

His research interests are in power electronics, mechatronics and robotics. He is a co-author of four books and has published over 1,000 technical papers in these areas. He has been active in various academic societies such as Institute of Electrical Engineers of Japan, Instrument and Control Engineers of Japan (SICE), Robotics Society of Japan (RSJ) and IEEE. He served as President of IEEE Industrial Electronics Society in 1986-1987, and 1990 IEEE Secretary. He was Founding Editor-in-Chief of IEEE/ASME Transactions on Mechatronics in 1995. He was also Editor-in-Chief of the IEEE Transactions on Industrial Electronics in 2000-2003. He served as President of IEE of Japan in the year 2001-2002. Dr. Harashima is a member of Science Council of Japan since October, 2005.

Dr. Harashima has received a number of awards including 1984 IEEE/IES Anthony J. Hornfeck Award, 1988 IEEE/IES Eugene Mittelmann Award, IEEE Third Millennium Medal, 2003 IEE of Japan Outstanding Achievement Award, and 2005 Officier dans l'Ordre des Palmes Academiques (Republic of France).

Professor Harashima is a Life Fellow in IEEE.

### ***About Satoshi Suzuki***

Satoshi Suzuki received his B.S. degree in Control Engineering, M.S. degree in Department of Systems Science, and Ph.D. in Department of Mechanical and Control Engineering from Tokyo Institute of Technology in 1993, 1995 and 2004, respectively.

From 1995 to 1999 he was a Development Engineer working for TOSHIBA Corporation at the Heavy Electrical Laboratory, Power & Industrial Systems R&D Center and the Elevator Development Center.

In 1999, he moved to Tokyo Denki University, and was employed as a research associate and an assistant professor in Frontier R & D Center and the 21st Century COE(Center Of Excellence) Project Office, respectively.



He is now an associate professor in Dept. of Robotics and Mechatronics.

His major research interests are human-machine system, control theory and robotics. He is a member of SICE, JSME and IEEE.