Electrical & Computer ENGINEERING **SEMINAR**

Thursday, September 17

Scaife Hall Auditorium
Room 125
4:30 p.m.
Refreshments at 4:00 p.m.

Professor Twan Basten

Professor of Computational Models, Electrical Engineering

Prof.dr.ir. Twan Basten is a professor of computational models in the Department of Electrical Engineering at the Eindhoven University of Technology (TU/e) and a research fellow at the Embedded Systems Institute, both located in Eindhoven, the Netherlands. He received his MSc and PhD degrees in Computing Science from the Eindhoven University of Technology in 1993 and 1998, respectively. Twan Basten worked as assistant and associate professor in Computer Science and Electrical Engineering at the TU/e, and as visiting researcher at the University of Waterloo, Ontario, Canada (1992-1993), Philips Research Laboratories (2000-2001) and Carnegie Mellon University, Pittsburgh, PA (2006). His research interest is the design of resource-constrained embedded systems, based on a solid mathematical foundation, with a special focus on networked and multiprocessor systems and computational models. Twan Basten is and has been involved in several national and international research projects, also as a project leader. He has served (or is serving) in over 40 technical program committees. He was the Ambient Intelligence co-chair in the DATE 2003 TPC, topic chair in the DATE 2004 and 2005 TPCs, the TPC co-chair for ACSD 2007, and TPC chair of MoCC 2008. He (co)authored over 100 scientific publications, of which three received a best paper award, and he (co)supervised 7 PhD degrees. He is a senior member of the IEEE and a life member of the ACM.

Reliable Run-time Adaptation in Resource-constrained Embedded Systems

Modern embedded devices have to operate in an increasingly dynamic environment. The availability of processing, storage, and communication resources may change over time, resource requirements of an application may vary depending on the input data, and quality requirements may change depending on the needs and preferences of a user. The question arises how to guarantee a reliable operation of an embedded system in these dynamic circumstances.

The answer needs to be found in run-time adaptation. However, solutions are constrained by the limited availability of resources in embedded systems and they should not interfere with normal operation. In addition, many aspects need to be taken into account, such as resource usage, power dissipation, timeliness, and user-perceived quality. This typically turns run-time adaptation problems into multi-objective optimization problems that need to be solved very fast with very limited computational resources.

We present an algebra of Pareto points as a general approach to solve multi-objective optimization problems in a compositional way. We show how the concepts of Pareto algebra can be used to provide solutions for run-time adaptation problems. We present two specific run-time adaptation solutions for Chip MultiProcessors (CMPs) and Wireless Sensor Networks (WSNs). The solutions are parameterized and compositional. The parameterization allows a trade-off between the quality of the result and the required computational resources. Compositionality ensures scalability of the solutions.

ECE Seminar Hosts

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