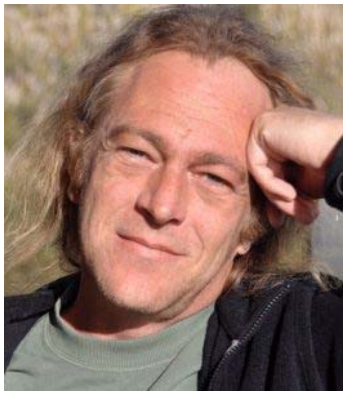
Keynote Speakers

DSD 2022

Keynote 1



Open-Source Research on Time-predictable Computer Architecture

Prof. Martin Schoeberl, ***Technical University of Denmark, Denmark***

Abstract:

Real-time systems need time-predictable computers to be able to guarantee that computation can be performed within a given deadline. For worst-case execution time analysis, we need detailed knowledge
of the processor and memory architecture. Providing the design of a processor in open-source enables the development of worst-cease execution time analysis tools without the unsafe reverse engineering of processor architectures. Open-source software is currently the basis of many Internet services, e.g., an Apache web server running on top of Linux with a web application written in Java. Furthermore, for most programming languages in use today, there are an open-source compilers available. However, hardware designs are seldom published in open-source. Furthermore, many artifacts developed in research, especially hardware designs, are not published in open-source. The two main arguments formulated against publishing research in open source are:

(1) "When I publish my source before the paper gets accepted, someone may steal my ideas" and
(2) "My code is not pretty enough to publish it; I first need to clean it up (which seldom happens)".

In this paper and in the presentation, I will give counterarguments for those two issues. I will present the successful T-CREST/Patmos research project, where almost all artifacts have been developed in open-source from day one. Furthermore, I will present experiences using the Google/Skywater open-source tool flow to produce a Patmos chip with 12 students within a one semester course.

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Biosketch:

Prof. Martin Schoeberl received his PhD from the Vienna University of Technology in 2005. From 2005 to 2010 he has been Assistant Professor at the Institute of Computer Engineering. He is now Professor at the Technical University of Denmark. His research interest is on hard real-time systems, time-predictable computer architecture, and real-time Java. Martin Schoeberl has been involved in a number of national and international research projects: JEOPARD, CJ4ES, T-CREST, RTEMP, the TACLe COST action, and PREDICT. He has been the technical lead of the EC funded project T-CREST. He has more than 100 publications in peer reviewed journals, conferences, and books.

Keynote 2

Looking for the Limits of Electronics for Autonomous Microsystems

Prof. Marisa López-Vallejo, ***Universidad Politécnica de Madrid, Spain***

Abstract:

Autonomous microsystems are microscale systems that do not need external power to operate and communicate for a given period of time. If we can build autonomous microsystems even with dimensions as small as the diameter of a human hair (< 100 μm) new use cases for sensing applications could be addressed. For example, microsensors could be embedded into fibers to produce smart clothing, new approaches to in-vitro and in-body sensing could be performed, etc. This keynote will address the challenges that electronic circuits must meet to be part of and support the design and integration of autonomous microsystems.

Biosketch:

Prof. Marisa López-Vallejo received the M.S. and Ph.D. degrees from the Universidad Politécnica de Madrid, Madrid, Spain, in 1993 and 1999, respectively. Since 2016 she is Full Professor with the Department of Electronic Engineering, Universidad Politécnica de Madrid. She was before with Lucent Technologies, Bell Laboratories, Murray Hill, NJ, USA, as a Member of the Technical Staff. During academic year 2015-2016 she was visiting professor at the Microsystems Technology Lab, MIT, USA. Her research interests include low-power, radiation and PVT-aware design, computer-aided diagnostic methods and tools, and application-specific high-performance programmable architectures. Last decade she has focused her research on the reliability of CMOS circuits and memristive memories as well as on new architectures to support reliable design beyond 20nm. She has been coordinator of a set of national and international (EU) projects on these areas. She has supervised 10 PhD theses and has published more than 100 papers in journals and conferences in the field.

Keynote 3

Designing Reliable Distributed Systems

Dr. Arne Hamann, ***Chief Expert - Distributed Intelligent Systems, Bosch Research, Germany***

Abstract:

Software is disrupting one industry after another. Currently, the automotive industry is under pressure to innovate in the area of software. New, innovative approaches to vehicles and their HW/SW architectures are required and are currently subsumed under the term “SW-defined vehicle”. However, this trend does not stop at the vehicle boundaries, but also includes communication with off-board edge and cloud services. Thinking it through further, this leads to a breakthrough technology we call “Reliable Distributed Systems”, which enables the operation of vehicles where time and safety-critical sensing and computing tasks are no longer tied to the vehicle, but can be shifted into an edge-cloud continuum. This allows a variety of novel applications and functional improvements but also has a tremendous impact on automotive HW/SW architectures and the value chain. Reliable distributed systems are not limited to automotive use cases. The ubiquitous and reliable availability of distributed computing and sensing in real-time enable novel applications and system architectures in a variety of domains: from industrial automation over building automation to consumer robotics. However, designing reliable distributed systems raises several issues and poses new challenges for edge and cloud computing stacks as well as electronic design automation.

Biosketch:

Dr. Arne Hamann obtained his PhD in Computer Science in 2008 from the Technical University of Braunschweig Germany. He is Chief Expert for “Distributed Intelligent Systems” at Bosch Research. Like the Bosch product portfolios his range of actives is very broad encompassing complex embedded systems where the interaction between physical processes hardware and software plays a major role through to distributed IoT systems with elements of (edge) cloud computing. In the academic contexts he is member of the editorial board of the ACM journal

“Transactions on Cyber Physical Systems” and regularly serves as program committee member for international conferences such as ECRTS, RTSS, RTAS, DAC, WFCS, ETFA, and ICCPS.