Workshop on Energy Efficiency for the Internet of Things and Beyond

31. January 2024
1315-1500
Room ITV-454, IT-bygget, Gløshaugen

Organizer: Magnus Jahre, IDI
Organized in collaboration with the IE faculty's strategic research areas on Energy Efficient Computing Systems (EECS) and the Internet of Things (IoT)

1315-1345	**Invited talk: Research in the Trustworthy Systems Lab at Bristol** *Professor Kerstin Eder, University of Bristol, UK* **Abstract:** We all know that trust can be gained and lost, re-gained and lost again. Trustworthiness, in contrast, should be demonstrable. Thus, in the Trustworthy Systems Lab at Bristol we research and develop techniques that enable engineers to create systems that are demonstrably trustworthy. Confidence in a system's trustworthiness can be gained in many different ways, including by design, through transparency (systems that allow us an insight into how and why they make certain decisions or use certain resources), and through rigorous verification and validation. In this presentation I will highlight our achievements and ongoing research in some of these challenging areas.
1345-1400	Questions and discussion
1400-1415	Break
1415-1445	**Invited talk: Computers can be General-Purpose and Energy-Efficient Too** *Associate Professor Nathan Beckmann, Carnegie Mellon University, USA* **Abstract:** Energy efficiency limits computing, across all scales. Von Neumann CPUs are catastrophically inefficient, wasting 99% of their energy. This inefficiency has led architects to develop specialized hardware accelerators that boost efficiency by orders of magnitude. Unfortunately, specialization also imposes large costs, hamstrings innovation, and is fundamentally limited in scope. This talk will describe our recent work on re-designing general-purpose computers around energy efficiency. I will describe a dataflow computer architecture that, along with a co-designed compiler, trades increased area for large savings in energy. This architecture eliminates or amortizes the wasted energy in von Neumann architectures, relying on the compiler to identify and exploit program structure. We will discuss applications from the Internet of Things to high-performance computing in the datacenter.
1445-1500	Questions and discussion

Speaker bios

Kerstin Eder is Professor of Computer Science and heads the Trustworthy Systems Laboratory (https://www.bristol.ac.uk/tsl) at the University of Bristol, UK. She also leads the research theme on Verification and Validation for Safety in Robots at the Bristol Robotics Lab. Her research is focused on specification, verification and analysis techniques that allow engineers to design a system and to verify or explore its behaviour in terms of functional correctness, security, performance and energy efficiency. Kerstin has gained extensive experience of verifying complex microelectronic designs while working with leading semiconductor design and Electronic Design Automation companies. In her research she seeks novel techniques and fundamental theoretical contributions to achieve solutions that make a difference in practice. Kerstin is a Royal Academy of Engineering "Excellence in Engineering" prize winner. She holds a PhD in Computational Logic, an MSc in Artificial Intelligence and an MEng in Informatics.

Nathan Beckmann is an Associate Professor in the Computer Science Department and Electrical and Computer Engineering Department at Carnegie Mellon University, and a co-Founder and Chief Scientist at Efficient Computer Company (https://efficient.computer/). His research improves the energy efficiency of general-purpose computer systems, through a combination of dataflow, datacentric computing, and caching techniques. He received his PhD from MIT in 2015 advised by Daniel Sanchez. His awards include multiple Best Papers, a Google Research Scholar, the SIGMICRO Hall of Fame, and the George M Sprowls Award for *outstanding PhD thesis in computer science at MIT*.