



How to Marry System-Level Design and Internet of Things – Challenges and Solutions

Computing applications are increasingly characterized by their direct interaction with physical world using sensors and actuators, distributed processing and communication via various kinds of networks and Internet connectivity and addressability. These systems are pervasive by their nature and incorporate Internet addressable and reachable smart elements, called Things, which in turn create Internet of Things. Examples of such systems include future smart grid, building automation, farming, traffic control and transportation, health monitoring and elderly care systems. Internet of Things will enable creation of such new systems and applications. While major technologies for creation of such systems have been explored and understood rather well by experts and researchers in computer engineering community, methods to build large systems that integrate multiple of aforementioned technologies and large number of Things are still in their very early stage.

System design methods, which go beyond traditional programming, are needed and are the only way to go ahead in creation of systems based on Internet of Things. In this seminar we will address some major involved technologies and give examples how large systems can be created using integrated design approach. New design paradigm that enables creation of systems based on Globally Asynchronous Locally Synchronous (GALS) model of computation accompanied with system-level design and programming language that abstracts the physical world, on one hand, and distributed heterogeneous computing platforms that incorporates Internet addressable elements, on the other hand, enable creation of new classes of embedded systems. Some of the challenges, future research directions and possible ways to address them will also be presented.



Zoran Salcic is a professor of computer systems engineering and Head of Department of Electrical and Computer Engineering at the University of Auckland, New Zealand. His main research interests include complex digital systems design, custom-computing machines, reconfigurable computing, processor and computer systems architectures, embedded systems and their implementation, design automation tools for embedded systems, hardware-software co-design, new computing architectures, formal models of computation and languages for heterogeneous systems, and wireless sensor and actuator networks. He has published around 250 peer-reviewed journal and conference papers, several books and numerous technical reports. He is a Fellow of the Royal Society New Zealand (Academy of Science) and recipient of Alexander von Humboldt Research Award in 2010.

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The department of Electrical and Computer Engineering at the University of Auckland, New Zealand, Head

Time: 10:30-12:00AM, Nov 27, 2012

Place: 二楼多功能厅, FIT Building

Organizer: Research Institute of Information Technology (RIIT), Tsinghua University