NEWSLETTER – November 2009

First Nano-Tera workshop coming up

Nano-Tera.ch, the Swiss scientific initiative in health, security and environment systems, will hold its very first workshop on November 23-24.

The event aims at developing a dynamic Nano-Tera community, allowing various research groups to exchange experience and know-how in a convivial atmosphere. The Swiss Foundation for Research in Microtechnology (FSRM) is responsible for the organization of the workshop, as part of its Nano-Tera funded Education and Dissemination project *(http://www.nano-tera.ch/projects/204.php)*

In order to define the main themes and orientations of this first meeting, an interactive approach was used. An online survey form enabled scientists involved in the various Nano-Tera projects to indicate their favorite topics from a wide list covering all aspects of the program. The analysis of these results revealed a strong interest for several themes, among which biosensors. This workshop will thus revolve around biosensors & body area networks, featuring keynote talks and tutorials by senior researchers coming from inside the Nano-Tera community as well as outside.

Registration is now closed and Nano-Tera and the FSRM are pleased to note that about 50 participants representing almost all the projects will be there, several of whom giving presentations of their current research (see rough breakdown below).
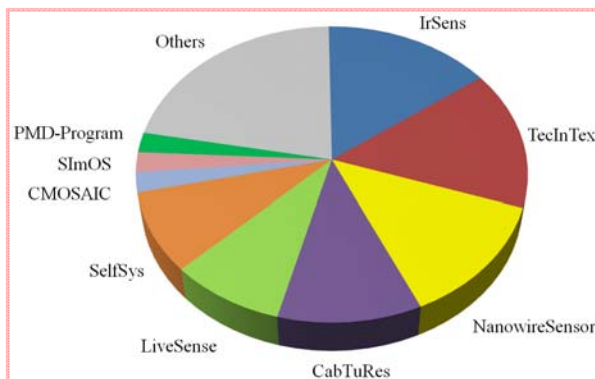
Breakdown of the workshop participants by project.

A new workshop will be organized in early 2010 on a different theme. ✂

Complexity Management Autumn School

COMES – Complexity Management in Tera-Scale Embedded Systems – is a Nano-Tera Education & Dissemination project led by Prof. Mariogiovanna Sami at the Università della Svizzera Italiana. As announced earlier, its Autumn School is currently taking place (November 16-20) in Lugano.

The school is bringing together some of the best lecturers from Europe, making it a fantastic opportunity for interaction. (*http://www.alari.ch/comes*)

Subjects discussed include design complexity of systems on chip (SoC), management of very complex, possibly distributed, systems, computational complexity, specific design aspects of complex software systems and more. ✂

Best paper award to Prof. David Atienza

Prof. David Atienza, of the Embedded Systems Laboratory of EPFL has just received a Best Paper award for his work related to the Nano-Tera project CMOSAIC.

It was awarded at the 17th annual IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SoC), held on October 12-14 in Florianópolis, Brazil. The paper, entitled *Modeling and Dynamic Management of 3D Multicore Systems with Liquid Cooling* is co-authored by Ayse K. Coskun and Tajana Simunic Rosing of the University of California, San Diego and José L. Ayala of the Complutense University of Madrid, and published in the conference proceedings (vol. 1, num. 1, 2009, p.60-65).

CMOSAIC is a Research, Technology and Development project led by Prof. John Thome of the LTCM Heat and Mass Transfer Laboratory (EPFL) which seeks to develop practical methods for heat removal in high performance 3D integrated circuits.

3D stacks of computer chips allow a huge functionality per unit volume. Besides, recent progress in the fabrication of through silicon vias have opened new ways for high density array interconnects between stacked processors and memory chips. The huge challenge is to remove the heat dissipated in an efficient way: this need for a

novel electro-thermal co-design is being addressed in CMOSAIC *(http://www.nano-tera.ch/projects/67.php)*.

Removing the heat with the coolant allows it to be dissipated directly to the ambient without use of refrigeration, thereby saving about 40% of the overall energy consumption compared to existing data centers. Indeed, clever integration of the waste heat from data center computers could make it re-usable for heating of buildings and other uses, thus potentially reducing the overall carbon footprint of a data center to zero.
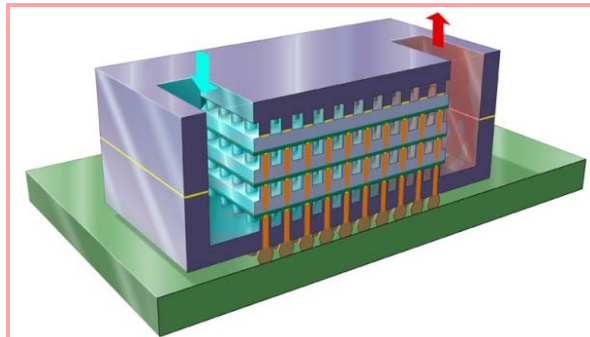
3D integrated circuit with through silicon vias and inter-layer cooling channels that is enclosed in a sealed manifold.

Prof. Atienza is working on the physical design, thermal modeling and optimization of 3D multiprocessor systems-on-chip (MPSoCs) at operating system level. The latest work presents a new thermal simulation model including liquid cooling for these architectures, achieving a 95% average reduction in MPSoC hot-spots with respect to state-of-the-art cooling techniques. �

Nano-Tera program presented

Prof. Giovanni de Micheli, spokesperson for the Nano-Tera.ch program, was offered the opportunity to present the program at the 2009 IEEE Bipolar/BiCMOS Circuits and Technology Meeting in Capri last October.

His talk (*http://www.nano-tera.ch/pdf/NTPres.pdf*) addressed the aim and scope of Nano-Tera, stressing how the areas covered in the projects – nanoelectronic design with silicon nanowires and carbon nanotubes, as well as the integration of sensors and MEMS – offer unprecedented opportunities in the areas of biosensing for health and environmental management. ✖

Unveiling the "Interactive Community" platform

**Nano-Tera's interactive community portal has been newly revamped.**

Nano-Tera.ch is developing on its website a "community of knowledge" platform around the Nano-Tera area of research.

The objective is to provide and develop an open web based sharing platform with complementary dynamic "inside-out" and "outside-in" knowledge management perspectives. This will steer general interest from internal and external players to the overall core research carried out within Nano-Tera.ch and its potential applications.

"Inside-out": each Nano-Tera project is linked to its own Wiki page. Every collaborator working within these projects is strongly encouraged to visit the wiki and complete the description of the project with additional information such as abstracts, news, didactic videos or interesting results published.

"Outside-in": general themes related to Nano-Tera have been identified to expand the vision of the application potentials for each research field. The first topics introduced so far are Body Health Monitoring, Green Computing, Distributed Sensor Network and Microfluidics. A (non-exhaustive) inventory of general information and news for each theme is being gathered and organized, and the corresponding pages will grow accordingly. Through this approach, a different image of the conducted research can be created and outlined for the benefit of the Nano-Tera community and interested parties that may want to join.

This interactive website is made **for the community and by the community**. The exchange of public information between the researchers and the outside world is paramount to catalyze visibility and output in the value chain from research to product development.
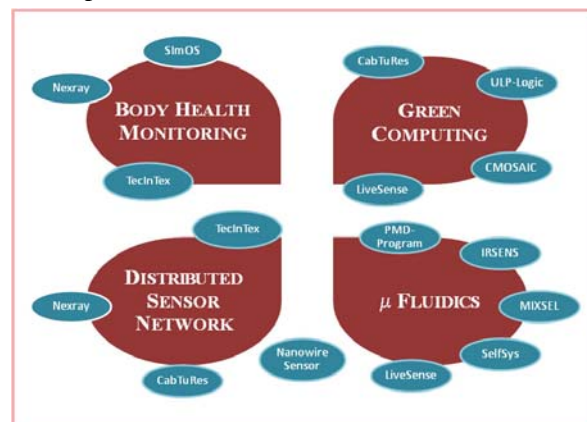
The Nano-Tera projects and the first identified themes on the newly developed portal.

Through each new input, the spectrum of interest and applications can be expanded and broadened. Therefore do not hesitate to become active and add your own input and contribution to these wiki pages.

http://www.nano-tera.ch/topdownbottomup/index.html ✖