



## **GUARDIAN ANGELS Workshop:** **“Guardian Angels for a Smarter Life: Science and Technology Beyond Fiction”**

**Date of the Workshop:** September 15-16, 2011, Helsinki, Finland - *during ESSDERC-ESSCIRC'2011*

**Organized by:** Francis Balestra, Sinano Institute-Grenoble INP/CNRS, Adrian Ionescu, EPFL

**Abstract:** This Workshop is supported by the Guardian Angels project funded by the European Commission for the 7th Framework Programme ([www.ga-project.eu](http://www.ga-project.eu)). Guardian Angels (GA) are future zero-power, intelligent, autonomous systems-of-systems featuring sensing, computation, and communication beyond human aptitudes. GA will assist humans from their infancy to old age in complex life situations and environments. Zero-power reflects system-of-systems ability to scavenge energy in dynamic environments by various harvesting techniques. The project prepares zero-power technologies based on future energy-efficient technologies, heterogeneous design, and disruptive energy scavengers.

**Program:**

**Thursday, September 15<sup>th</sup> afternoon (14:30-18:30)**

- 14:30 “ Guardian Angels FET Flagship”, Adrian Ionescu, EPFL
- 15:00 “Possible strategies for low power in Beyond CMOS: views from the NANOTEC project”, Clivia Sotomayor Torres, CIN2-CSIC
- 15:30 “EUROSOI, Thematic Network on Silicon on Insulator technology, devices and circuits”, Francisco Gamiz, University of Granada
- 16:00 “Graphene-based devices and applications”, Max Lemme, KTH
  
- 16:30 *Coffee break*

**-17:00 Rump session “Challenges and possible solutions for Zero Power Systems”**

- ⇒ The previous and the following invited speakers will present their view in the field of ultra low energy computation and communication, and energy harvesting. They will also answer questions concerning their vision about the "ultimate" ULP computation/communication and energy harvesting, which could be used in Guardian Angels. The following speakers will give a short talk (**5-7 mn**) for introducing the rump session:

- “Energy efficiency studies in mobile radio networks”, Tao Chen, VTT
- “Harvesting from RF sources”, Alessandra Costanzo, University of Bologna
- “Materials for Lithium microbatteries”, James Rohan, Tyndall
- “Thermoelectric energy harvesting, Sinano Institute: Mireille Mouis, Grenoble INP, Clivia Sotomayor Torres, CIN2-CSIC, Emmanuel Dubois, IEMN
- “A biologically plausible spiking neuron in hardware”, Steve Hall, Liverpool University
- “Energy efficient memories”, Sinano Institute: Olof Engstrom, Chalmers University/ITE, S. Cristoloveanu, Grenoble INP, Francisco Gamiz, University of Granada
- “Low power VLSI Design”, Georges Gielen, KU Leuven

*-18:30 End of the Rump Session*

### Friday, September 16<sup>th</sup> (8:30-16:30)

*-Common session with Nanofunction/Sinano Workshop-*

- 8:30 “System architecture for Harvesting”, Herve Fanet, CEA LETI
- 8:55 “Self-Powered Health Patches enabled by a new paradigm: Consume more to consume less”, Chris Van Hof, IMEC
- 9:20 “Development of miniaturized batteries for energy autarkic sensors”, Robert Hahn, Fraunhofer-IZM
- 9:45 “Toward Zero-Power ICT: a European initiative for efficient powering of micro and nanoscale autonomous devices”, Luca Gammaitoni, University of Perugia

*-10:10 Coffee break*

- 10:30 “Energy harvesting from glucose and oxygen. Can biofuel cells power up smart autonomous Systems ?”, Grégoire Herzog, Tyndall
- 10:55 “Vibrational energy scavenging”, Saibal Roy, Tyndall
- 11:20 “Disruptive solar energy harvesting”, Sinano Institute: Enrico Sangiorgi, IUNET, Steve Hall, Univ. Liverpool, Jurriaan Schmitz, Univ. Twente, Mireille Mouis, Anne Kaminski, Grenoble INP, Dimitris Tsoukalas, IMEL, Piotr Grabiec, ITE, Siegfried Mantl, Juelich

*-12:00-13:30: Buffet lunch*

- 13:30 “Ethical Issues of Emerging Technologies: design challenges of smarter life”, Ikonen Veikko, VTT
- 14:00 “Tunnel FETs”, Adrian Ionescu, EPFL
- 14:30 “ Sub KT Low Energy Transistors and Sensors”, Lukas Worschech, Uni. Wuerzburg
- 15:00 “FerroElectric Multifunctional tunnel junctions for MEMristors and Spintronics”, Agnès Barthélémy, Thales/CNRS
- 15:30 “EU NoE in Wireless Communications NEWCOM”, Denis Flandre, UCL
- 16:00 “European research on ultra-wideband and foreseen implications to Guardian Angels”, Antti Anttonen, VTT

*16:30 End of Workshop*