Πανεπιστήμιο Κύπρου
University of Cyprus

School of Engineering
Department of Electrical and Computer Engineering

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Department of Electrical and Computer Engineering

Title: "Neuromorphic computing: building blocks and methods for implementing neural computing systems in hybrid analog/digital VLSI technology"

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Room: ΧΩΔ02 – 012, New Campus
University of Cyprus

Abstract:
Neuro-computing is concerned with the implementation of artificial neural networks for solving practical problems. Neuromorphic computing on the other hand aims to reproduce the principles of neural computation by emulating as faithfully as possible the detailed biophysics of the nervous system in hardware. A major characteristic of these microelectronic systems is their use of transistors operated in the ``weak inversion'' or ``subthreshold'' domain. In this domain, the behavior of the transistors is governed by the same Boltzman statistics that characterize the properties of proteic channels in neuron cell membranes. Other important characteristics of neuromorphic systems include the use of ``spikes'' for representing and processing signals, and the presence of learning and adaptation at multiple time scales.
In this presentation I will describe neuromorphic electronic circuits that directly emulate the properties of neurons and synapses, and show how they can be configured to implement real-time compact neural processing systems. I will describe hardware models of spiking neurons, synapses, including plasticity mechanisms at multiple time-scales, and show how to configure networks of such circuits to implement neuromorphic cognitive systems.

Biography:
Giacomo Indiveri is a Professor at the Faculty of Science of the University of Zurich, Switzerland. He obtained an M.Sc. degree in electrical engineering and a Ph.D. degree in computer science from the University of Genoa, Italy. Indiveri was a post-doctoral research fellow in the Division of Biology at Caltech and at the Institute of Neuroinformatics of the University of Zurich and ETH Zurich. In 2006 he attained the "habilitation" in Neuromorphic Engineering at the ETH Zurich Department of Information Technology and Electrical Engineering, and in 2011 he was awarded an ERC Starting fellowship on "Neuromorphic processors: event-based VLSI models of cortical circuits for brain-inspired computation". His research interests lie in the study of neural computation, with particular interest in spike-based learning and selective attention mechanisms, and in the hardware implementation of real-time sensory-motor systems using neuromorphic circuits and VLSI technology.