Frontiers in Neuromorphic Computation: a multi-FACETS enterprise

including the FACETS-ITN Joint Industry Workshop

Organized by the FACETS consortium
http://facets.kip.uni-heidelberg.de/

Collège de France, Place Marcellin Berthelot, Paris 5e
Thursday 3rd and Friday 4th June 2010

Scientific Committee: Alain Destexhe, Yves Frégnac, Kirsty Grant, Anders Lansner, Wolfgang Maass, Guillaume Masson, Karlheinz Meier

(Following the ISCAS conference : Nano-bio circuits and systems
Paris-Disneyland, 28th May to 2nd June 2010
http://www.iscas2010.org)

Context and aims of the Conference :

The FACETS (**F**ast **A**nalog **C**omputing with **E**mergent **T**ransient **S**tates) project has created a theoretical and experimental base for the exploration of novel concepts of information processing going beyond the classical Turing machine, taking inspiration for novel computing paradigms from the integrative and adapative concepts observed in biological nervous systems, and in particular in cortical networks of higher vertebrates.

Our aim is to provide improved insight into computing principles inspired by brain function and architecture, and to illustrate those principles in new generations of parallel, large-scale electronic circuits. These insights may potentially contribute to an improved understanding of dynamical processes involved in cognition or in mental disorders in the human brain, and may lead to the development of new strategies in brain-machine communication. The research effort involves continuous interaction and scientific exchange between experimental neuroscience, computer modelling and hardware emulation, and provides an interdisciplinary infrastructure that is unique in Europe.

FACETS is a multi-disciplinary Integrated Project funded by the European Commission Future and Emerging Technologies (FET) section of the Information and Communication Technologies (ICT) programme. EC ICT-FET is an incubator and pathfinder for new ideas and themes for long-term research in the area of information and communication technologies. The FACETS consortium has trained more than 80 PhDs over a 4 year period, now continuing with a Marie-Curie Initial Training Network programme, FACETS-ITN**,** which will support the interdisciplinary training and research work of 22 new Ph.D. positions at the FACETS-ITN partner labs.

The goal of the Paris 2010 conference: "Frontiers in Neuromorphic Computation", is to present the achievements of the FACETS project and to emphasize the importance of training young scientists in the context of interdisciplinary research. The conference will include contributions from industrial partners and will host key-note speakers and leaders from other projects supported by the EPSRC (UK), IBM, Honda Research and EC ICT-FET (SPINNAKER, the Blue Brain project, Brain-i-Nets, DAISY, SECO).

Frontiers in Neuromorphic Computation

Collège de France, 11 Place Marcellin Berthelot, 75005 Paris

Thursday, 3 June 2010 : Salle Halbwachs

Frontiers in Neuromorphic Computation

09:00	Frontiers in Neuromorphic Computation	**Karlheinz Meier** (UHEI, Heidelberg)
09:30	**Keynote speaker**: What can we learn from Biology for Computing?	**Rodney Douglas** (UZH, Zürich)
10:00	Ideas for a Biologically Inspired Bayesian Computer	**Wolfgang Maass** (TU, Graz)
10:30	Coffee break	
11:00	Associative memory architectures on supercomputers and neuromorphic systems	**Anders Lansner** (KTH, Stockholm)
11:30	**Keynote speaker**: The Spinnaker Project	**David Lester** (APT, Manchester)
12:00	Presentation of the COST Programme, an intergovernmental framework for European Cooperation in Science and Technology	
12:15	Lunch	

Joint Bio-inspired Computation - Industry Workshop

14:00	In silico memristor networks: learning and training	**Anteo Smerieri** (Univ. Parma)
14:30	Samsung Basic Research	to be confirmed
15:00	From Biology to Technology - Computational Neuroscience in Corporate Research	**Marc-Oliver Gewaltig** (Honda Research Inst., Offenbach)
15:30	Coffee break	
16:00	Design and Verification Challenges for Integrated Mixed-Signal-Systems	**Achim Graupner** (ZMDI, Dresden)
16:30	High Density Full-Wafer Wiring	**Thomas Fritzsch** (Fraunhofer IZM, Berlin)
17:00	Hardware spiking neural networks: models and experiments at the cellular level	**Sylvie Renaud** (IMS, Bordeaux)
17:30 - 18:15	Round-table discussion "Neuroscience and IT – Synergies in two directions?" Chair: Karlheinz Meier, with Ryad Benosman, Gérard Berry, Alain Berthoz, Gordon Cheng, Rodney Douglas, Marc-Oliver Gewaltig, David Lester, Piotr Dudek	

Friday, 4 June 2010 : **Amphithéatre Marguerite de Navarre**

Frontiers in Neuromorphic Computation: Responding to the challenges

09:00	**Welcome address** : Thinking about, modeling, and mastering computation	**Gérard Berry** (College de France, Paris)
09:15	**Keynote speaker**: From Brain Architecture to Computing Principles	**Alain Berthoz** (College de France, Paris)
09:45	A polymorphic view of visual cortical dynamics: from "crystal" to "smoke"	**Yves Fregnac** (CNRS-UNIC, Gif sur Yvette)
10:15	How good are neuron models?	**Wulfram Gerstner** (EPFL-LCN, Lausanne)
10:45	Coffee break	
11:15	Behavioural receptive fields and cortical gain control	**Guillaume Masson** (CNRS-INCM, Marseille)
11:45	Control of interplay between excitation and inhibition by the visual input statistics: a V1 FACETS model	**Jens Kremkow** (ALUF, Freiberg)
12:15	**Keynote speaker**: Transient dynamics in neural processing: from bees to the human brain	**Gilles Laurent** (MPI-BRI, Frankfurt)
12:45	Light Lunch (in the Foyer Marguerite de Navarre)	
14:00	**Keynote speaker**: Lessons from Intelligent Robotics	**Gordon Cheng** (TU Munich)
14:30	**Keynote speaker**: Attractor models of persistent activity in decision-making cortical areas	**Nicolas Brunel** (CNRS & Univ. Paris 5, Paris)
15:00	Stochastic activity and high-conductance states, from single neurons to macroscopic levels	**Alain Destexhe** (CNRS-UNIC, Gif sur Yvette)
15:30	Achievements in mesoscopic modeling of visual area V1: two-dimensional neural fields with feature representation and propagation delays	**Olivier Faugeras** (INRIA, Sophia-Antipolis)
16:00	Coffee break	
16:30	Integration: a collaborative software tool-chain for neuromorphic computation	**Andrew Davison** (CNRS-UNIC, Gif sur Yvette)
17:00	The FACETS wafer-scale neuromorphic hardware system	**Johannes Schemmel** (UHEI, Heidelberg)
17:30	**Keynote speaker**: The cortical BlueBrain project and beyond	**Henry Markram** (EPFL-LNMC, Lausanne)
18:00	Where do we go from here ?	**Karlheinz Meier** (UHEI, Heidelberg)