



BIES: Brain-Inspired Electronic Systems

The workshop is supported jointly by the EU Network of Excellence NANOSIL, Visionary Project 2.5.1 and the Electronics Knowledge Transfer Network, UK which promotes the Grand Challenge: 'Building Brains'. The workshop is targeted at both academic and industrial delegates, with an aim to foster collaborations between the two sectors. It comprises of a number of talks from academic groups working in this area, and includes sessions for brain-storming ideas in both blue-skies and industrial contexts.

Significant research has focused on the development of Neural Network (NN) models in Brain-Inspired Electronic Systems that can be implemented in hardware and used to inspire new techniques for real-time computations. However, there exist several fundamental bottlenecks that restrict the progress towards biological scale networks in hardware, such as power consumption, compactness of neuron cells and interconnect, off-chip versus on-chip training. More immediate applications relate to, for example, fault-tolerant or evolutionary computational systems.

The objective of the Grand Challenge: 'Building Brains' is to create microelectronic designs and architectures that deliver very high levels of performance for this area, and thereby help test hypotheses and explore the wider space of asynchronous event-coupled dynamical systems. Progress towards this Grand Challenge would create systems enabling much larger neural models to be simulated than is possible at present. This is likely to be a significant contribution to the higher-level GC of understanding the architecture of brain and mind, whose impact upon humanity would be dramatic.

Workshop Organisers: Steve Hall (University of Liverpool), Wayne Luk (Imperial College London), Liam McDaid (University of Ulster) and Daniel Dearing (Electronics KTN)

Programme:

9:00: **Introduction and overview 'Building Brains':** Wayne Luk, Imperial College, UK and Daniel Dearing, Knowledge Transfer Network, UK

10:00 **Coffee, Posters and Networking**– *Interested delegates are encouraged to contribute a poster to promote their research*

10.45 **Giacomo Indiveri**, ETHZ, Switzerland

11:15 **Piotr Dudek**, University of Manchester UK

11:45 **Leena Patel/Alan Murray**, University of Edinburgh, UK

12:15 **Networking Lunch**

13:30 **Alex Rast**, University of Manchester, UK

14:00 **Steve Hall/Liam McDaid**, University of Liverpool/University of Ulster, UK

14.30 **Workshop Breakout Session** – facilitated by partner organisations and aimed at identifying themes and research projects including those of use to industry.

15:30 **Feedback Session and Discussion**– nominated speakers from each of the workgroups present the outcomes; followed by open discussion

16:00 Close