

Seminar announcement

Prof. Andrew Brown (University of Southampton, UK)

## Analogue system simulation: the event-driven way

May 30, 2024 – 9am Meeting room no. 4 – 4th floor - Dip. Automatica e Informatica (DAUIN)

## Abstract

Event-driven processing is an unusual computing technique, which can - under certain circumstances, and for certain classes of application - produce massive ( $O(10^4)$ ) speedups over conventional architectures. Event-driven machines - of which POETS and SpiNNaker are existence proofs - open the door to a new class of computing technique: event-driven computing. To exploit the capabilities of this type of architecture requires a new way of formalizing problems: you cannot simply port an existing codebase, however elegantly structured, to an event-based system and expect to get any of the advantages it offers. It is necessary to go back to the underlying mathematical foundations and re-cast the problem in a manner that is capable of exploiting the capabilities of the hardware. (Automating this - creating a compiler to target an event-driven architecture - is an unsolved research problem.)

In this talk, we describe how event-based solution techniques may be used to attack one of the pivotal problems in design automation: that of analogue circuit simulation. This fundamental algorithm has been the subject of intense study for decades, stubbornly resisting all attempts to parallelise it. Here we outline how the problem may finally be attacked with a parallel architecture (albeit with a phenomenal core count) and present some initial results unambiguously demonstrating the potential of the technique.

## Bio

Andrew Brown currently holds an established chair in Electronics at the University of Southampton. He received a BSc in Physical Electronics from Southampton in 1976 and a PhD in Microelectronics in 1981. He held brief posts as research fellow and computer manager in the Electronics Department at Southampton before being appointed a lecturer at the end of 1980. He was promoted to Senior Lecturer in 1989, Reader in Electronics in 1992 and to one of the established chairs in 1999. During his time as an academic, he has spent numerous secondments and sabbaticals working in industry. In 1983 he was appointed a Visiting Scientist in the Machine Technology group at IBM Hursley, UK, working on electronic place and route systems for uncommitted logic arrays. In 1985, along with three other academics, he founded Horus System Ltd, an EDA startup (backed by Cirrus Computers) to exploit simulation technology developed at the University. In 1988, he worked at Siemens NeuPerlach (Munich, Germany) on a micro-router for their in-house VENUS EDA suite. In 1995 he was awarded a Senior Academic in Industry secondment to work at a small communications company, MAC,

developing a placement tool used in decision support for the placement of mobile phone base stations. In 2001, he cofounded LME Design Automation, a venture capital-backed spinout to exploit an EDA synthesis suite that was been the prime focus of his University research at that time. One consequence of this startup was that he was awarded a Royal Society Industrial Fellowship to continue his work there until 2003. In 2004, he was appointed a Visiting Professor at the University of Trondheim, Norway, and spent time there integrating the simulation and synthesis work of the previous two startup companies. In 2008 he was appointed a Visiting Professor at the Computing Laboratory, University of Cambridge, UK. He was head of the Design Automation Research Group at Southampton from 1993 to 2007, when he became involved in the Manchester SpiNNaker system, and was able to obtain EPSRC support to allow him to work full time on the project, relinquishing all teaching, supervision and management responsibilities.

Andrew Brown is Fellow of the IET and BCS, a Senior Member of the IEEE, a Chartered Engineer and a registered European Engineer.

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