Keynote Address I

Real World Applications of Adaptive and Evolvable Systems

Tetsuya Higuchi

National Institute of Advanced Industrial Science and Technology, Japan

Abstract

Dr. Higuchi is the leading figure in the real world applications of evolvable hardware. His speech will focus on semiconductor applications including analog LSI, clock timing adjustment, high-speed data transmission using the idea of evolvable hardware. While digital hardware design has made rapid progress due to advances in EDA software tools, analog hardware design is still highly reliant on the experience and maturity of analog hardware designers. It makes the applications of evolvable hardware in semiconductor become more and more important.
Keynote Address II

Neural Systems Engineering: Brain-Inspired Computing

Steve Furber

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The University of Manchester, UK

Abstract

The real-time modelling of large systems of spiking neurons is computationally very demanding in terms of processing power, synaptic weight memory requirements and communication throughput. We propose to build a high-performance computer for this purpose with a multicast communications infrastructure inspired by neurobiology. The core component will be a chip multiprocessor incorporating some tens of small embedded processors, interconnected by an NoC that carries spike events between processors on the same or different chips. The design emphasizes modelling flexibility, power-efficiency, and fault-tolerance, and is intended to yield a general-purpose platform for the real-time simulation of large-scale spiking neural systems.

The system will be adaptive with respect to both its fault-tolerance mechanisms and the natural adaptivity of the biological systems it is used to model.
Keynote Address III

High-Performance Reconfigurable Computing—The View from Edinburgh

Rob Baxter

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Abstract

This paper reviews the current state of the art in high-performance reconfigurable computing (HPRC) from the perspective of EPCC, the high-performance computing centre at the University of Edinburgh. We look at architectural and programming trends and assess some of the challenges that HPRC needs to address in order to drive itself across the chasm from the optimistic early adopters to the pragmatic early majority.
Abstract

Shoeprint evidence is often left at scenes of crime, but is not always exploited. There is an increasing amount of research in developing systems to provide more rapid identification of footwear tread patterns. The need to identify scene of crime shoemark images, which can be very significantly degraded, is the real challenge. In this paper we review current approaches to this problem, and we present some novel methods and results for two different ways of addressing the problem - namely in the spatial domain and in the transform domain. In the spatial domain, improvements to existing techniques lead to two novel variations which we call the Modified Harris-Laplace (MHL) detector, and the enhanced SIFT descriptor. In the transform domain, we present results of a technique based on Phase-Only Correlation.