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Preface

The idea of evolving machines, whose origins can be traced to the cybernetics movement of the 1940s and 1950s, has recently resurged in the form of the nascent field of bio-inspired systems and evolvable hardware. The inaugural workshop, Towards Evolvable Hardware, took place in Lausanne in October 1995, followed by the First International Conference on Evolvable Systems: From Biology to Hardware (ICES), held in Tsukuba, Japan in October 1996. The second ICES conference was held in Lausanne in September 1998, with the third and fourth being held in Edinburgh, April 2000 and Tokyo, October 2001 respectively. This has become the leading conference in the field of evolvable systems and the 2003 conference promised to be at least as good as, if not better than, the four that preceded it.

The fifth international conference was built on the success of its predecessors, aiming at presenting the latest developments in the field. In addition, it brought together researchers who use biologically inspired concepts to implement real systems in artificial intelligence, artificial life, robotics, VLSI design and related domains. We would say that this fifth conference followed on from the previous four in that it consisted of a number of high-quality interesting thought-provoking papers.

We received 58 papers in total. All of these papers were reviewed by three independent reviewers. As such, we feel that we compiled an excellent package for ICES 2003. The conference included 3 keynote talks titled: “Nano- and biotechnology,” “From wheels to wings with evolutionary spiking neurons,” and “Machine design of quantum computers: A new frontier.” We had 41 technical presentations, a panel debate, and 3 tutorials in the areas of: evolutionary algorithms, evolvable hardware and reconfigurable devices, and nanotechnology. In addition to the technical program, there was a strong and varied social program both during and after the conference.

We would like to thank the reviewers for their time and effort in reviewing all of the submitted papers. We would also like to thank the other members of the organizing committee, including the local chair Keith Downing and publicity chair Gunnar Tufte. We are most grateful to Frode Eskelund, Diego Federici, and Karstein A. Kristiansen for their great help in developing the web-based paper submission and registration tool. We wish to thank the following for their contribution to the success of this conference: The Research Council of Norway; European Community IST programme; Norwegian University of Science and Technology; University of Oslo; European Office of Aerospace Research and Development, Air Force Office of Scientific Research, United States Air Force Research Laboratory; Telenor ASA; Atmel; and Siemens. Finally, we would like to thank all of those authors who put so much effort into their research and decided to publish their work at our conference.
What topics might we consider important for the next few years? It is clear that the field is still developing, evolving, and that many of the “hot” topics at this conference will be seen again next time. These will include: evolutionary hardware design; co-evolution of hybrid systems; evolving hardware systems; intrinsic, and on-line evolution; hardware/software co-evolution; self-repairing hardware; self-reconfiguring hardware; embryonic hardware; morphogenesis; novel devices; adaptive computing; and of course we are always looking for, and interested in, real-world applications of evolvable hardware. Will we see breakthroughs relating to nanotechnology, new reconfigurable FPGAs and new models of reliability for long space missions? Only time will tell – as with all evolution.

We hope you enjoy reading these proceedings as much as we enjoyed putting them together.

January 2003

Andy M. Tyrrell
Pauline C. Haddow
Jim Torresen
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