

Evolvable Systems: From Biology to Hardware

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Preface

A dictionary interpretation of an ‘Evolvable System’ would be “anything formed of parts placed together or adjusted into a connected whole” that can be “gradually worked out or developed.” When we then consider our subtitle ‘From Biology to Hardware’, we are plunged into a wonderful world of possibilities mixing the leading edge of hardware technology with our best understanding of natural and biological processes.

For the majority of the papers in this volume, the ‘System’ is some sort of electronics that needs designing, and the ‘gradual development’ is an algorithm capturing some of the essentials of Darwinian evolution. However, our wider definition of ‘Evolvable’ is partly explored in papers taking some of the abstract principles of nervous systems, immune systems, and of multicellular development and self-repair. There is a fascinating mix of the here-and-now of engineering applications and problem solving, with radical projects for future systems of a kind not seen before. As the field develops, we expect it to include a wider inspiration from nature at large, and other kinds of ‘Hardware’: for example with mechanical, fluid, few-electron, or chemical components, perhaps designed at nano-scales.

Nature is not a box of ready-made solutions to fulfil our engineering aspirations. Within these pages, great creativity can be seen in ingeniously transducing and adapting ideas from nature for our technological ends. Many of the papers contribute to a general understanding of how this can work, rather than showing how one specific problem can be solved.

This was the third international conference of the series started in 1996 (with an earlier workshop in 1995; see volumes 1062, 1259, and 1478 of the Lecture Notes in Computer Science series). We thank the scrupulous reviewers, and above all the authors, for enabling this collection of papers to be of a quality that can be viewed as a landmark in this nascent field.

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Enjoy!

April 2000

Julian Miller, Adrian Thompson
Peter Thomson, and Terence C. Fogarty

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