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Soggetti	Software engineering Computer science Computer networks Artificial intelligence Computers, Special purpose Software Engineering Theory of Computation Computer Communication Networks Artificial Intelligence Computer Science Logic and Foundations of Programming Special Purpose and Application-Based Systems
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Nota di contenuto	Session 1: Evolving Digital Circuits -- Measuring the Performance and Intrinsic Variability of Evolved Circuits -- An Efficient Selection Strategy for Digital Circuit Evolution -- Introducing Flexibility in Digital Circuit Evolution: Exploiting Undefined Values in Binary Truth Tables -- Evolving Digital Circuits Using Complex Building Blocks -- Session 2: Artificial Development -- Fault Tolerance of Embryonic Algorithms in Mobile Networks -- Evolution and Analysis of a Robot Controller Based

on a Gene Regulatory Network -- A New Method to Find Developmental Descriptions for Digital Circuits -- Sorting Network Development Using Cellular Automata -- Session 3: GPU Platforms for Bio-inspired Algorithms -- Markerless Articulated Human Body Tracking from Multi-view Video with GPU-PSO -- Evolving Object Detectors with a GPU Accelerated Vision System -- Systemic Computation Using Graphics Processors -- Session 4: Implementations and Applications of Neural Networks -- An Efficient, High-Throughput Adaptive NoC Router for Large Scale Spiking Neural Network Hardware Implementations -- Performance Evaluation and Scaling of a Multiprocessor Architecture Emulating Complex SNN Algorithms -- Evolution of Analog Circuit Models of Ion Channels -- HyperNEAT for Locomotion Control in Modular Robots -- Session 5: Test, Repair and Reconfiguration Using Evolutionary Algorithms -- The Use of Genetic Algorithm to Reduce Power Consumption during Test Application -- Designing Combinational Circuits with an Evolutionary Algorithm Based on the Repair Technique -- Bio-inspired Self-testing Configurable Circuits -- Evolutionary Design of Reconfiguration Strategies to Reduce the Test Application Time -- Session 6: Applications of Evolutionary Algorithms in Hardware -- Extrinsic Evolution of Fuzzy Systems Applied to Disease Diagnosis -- Automatic Code Generation on a MOVE Processor Using Cartesian Genetic Programming -- Coping with Resource Fluctuations: The Run-time Reconfigurable Functional Unit Row Classifier Architecture -- Session 7: Reconfigurable Hardware Platforms -- A Self-reconfigurable FPGA-Based Platform for Prototyping Future Pervasive Systems -- The X2 Modular Evolutionary Robotics Platform -- Ubichip, Ubidule, and MarXbot: A Hardware Platform for the Simulation of Complex Systems -- Implementation of a Power-Aware Dynamic Fault Tolerant Mechanism on the Ubichip Platform -- Session 8: Applications of Evolution to Technology -- Automatic Synthesis of Lossless Matching Networks -- A Novel Approach to Multi-level Evolutionary Design Optimization of a MEMS Device -- From Binary to Continuous Gates -- and Back Again -- Adaptive vs. Self-adaptive Parameters for Evolving Quantum Circuits -- Session 9: Novel Methods in Evolutionary Design -- Imitation Programming -- EvoFab: A Fully Embodied Evolutionary Fabricator -- Evolving Physical Self-assembling Systems in Two-Dimensions.

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## Sommario/riassunto

Biology has inspired electronics from the very beginning: the machines that we now call computers are deeply rooted in biological metaphors. Pioneers such as Alan Turing and John von Neumann openly declared their aim of creating artificial machines that could mimic some of the behaviors exhibited by natural organisms. Unfortunately, technology had not progressed enough to allow them to put their ideas into practice. The 1990s saw the introduction of programmable devices, both digital (FPGAs) and analogue (FPAAs). These devices, by allowing the functionality and the structure of electronic devices to be easily altered, enabled researchers to endow circuits with some of the same versatility exhibited by biological entities and sparked a renaissance in the field of bio-inspired electronics with the birth of what is generally known as evolvable hardware. Ever since, the field has progressed along with the technological improvements and has expanded to take into account many different biological processes, from evolution to learning, from development to healing. Of course, the application of these processes to electronic devices is not always straightforward (to say the least!), but rather than being discouraged, researchers in the community have shown remarkable ingenuity, as demonstrated by the variety of approaches presented at this conference and included in these proceedings.

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