1. Record Nr. UNINA9910254166703321

Titolo	Advances in Unconventional Computing : Volume 2: Prototypes, Models and Algorithms / / edited by Andrew Adamatzky
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2017
ISBN	3-319-33921-4
Edizione	[1st ed. 2017.]
Descrizione fisica	1 online resource (IX, 812 p. 428 illus., 234 illus. in color.)
Collana	Emergence, Complexity and Computation, , 2194-7287 ; ; 23
Disciplina	004.0151
Soggetti	Computational intelligence Computational complexity Artificial intelligence Computational Intelligence Complexity Artificial Intelligence
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Implementing Molecular Logic Gates, Circuits, and Cascades Using DNAzymes -- Enzyme-Based Reversible Logic Gates Operated in Flow Cells -- Modeling and Modifying Response of Biochemical Processes for Biocomputing and Biosensing Signal Processing -- Sensing Time Dependent Inflow Parameters with an Enzymatic Reaction -- Combinational Logic Circuit Based on BZ Reaction -- Associative Memory in Reaction-Diffusion Chemistry -- Calculating Voronoi Diagrams Using Chemical Reactions -- Light-sensitive Belousov-Zhabotinsky Computing through Simulated Evolution -- On Synthesis and Solutions of Nonlinear Differential Equations - a Bio-Inspired Approach -- Marangoni Flow Driven Maze Solving -- Chemotaxis and Chemokinesis of Living and Non-Living Objects -- Computing with Classical Soliton Collisions -- Soliton-Guided Quantum Information Processing -- Models of Computing on Actin Filaments -- Modeling DNA Nanodevices Using Graph Rewrite Systems -- Unconventional Computing Realized with Hybrid Materials Exhibiting the PhotoElectrochemical Photocurrent Switching (PEPS) Effect -- Organic

Memristor Based Elements for Bio-Inspired Computing -- Memristors in Unconventional Computing: How a Biomimetic Circuit Element can be Used to Do Bioinspired Computation -- Nature-Inspired Computation: An Unconventional Approach to Optimization -- On Hybrid Classical and Unconventional Computing for Guiding Collective Movement -- Cellular Automata Ants -- Rough Set Description of Strategy Games on Physarum Machines -- Computing a Worm: Reverse-Engineering Planarian Regeneration -- An Integrated In Silico Simulation and Biomatter Compilation Approach to Cellular Computation -- Plant Roots as Excellent Pathfinders: Root Navigation Based on Plant Specific Sensory Systems and Sensorimotor Circuits -- Soft Plant Robotic Solutions: Biological Inspiration And Technological Challenges -- Thirty Seven Things to Do with Live Slime Mould -- Experiments in Musical Biocomputing: Towards New Kinds of Processors for Audio and Music -- Immunocomputing and Baltic Indicator of Global Warming -- Experimental Architecture and Unconventional Computing.

Sommario/riassunto

The unconventional computing is a niche for interdisciplinary science, cross-bred of computer science, physics, mathematics, chemistry, electronic engineering, biology, material science and nanotechnology. The aims of this book are to uncover and exploit principles and mechanisms of information processing in and functional properties of physical, chemical and living systems to develop efficient algorithms, design optimal architectures and manufacture working prototypes of future and emergent computing devices. This second volume presents experimental laboratory prototypes and applied computing implementations. Emergent molecular computing is presented by enzymatic logical gates and circuits, and DNA nano-devices. Reaction-diffusion chemical computing is exemplified by logical circuits in Belousov-Zhabotinsky medium and geometrical computation in precipitating chemical reactions. Logical circuits realised with solitons and impulses in polymer chains show advances in collision-based computing. Photo-chemical and memristive devices give us a glimpse on hot topics of a novel hardware. Practical computing is represented by algorithms of collective and immune-computing and nature-inspired optimisation. Living computing devices are implemented in real and simulated cells, regenerating organisms, plant roots and slime mould. The book is the encyclopedia, the first ever complete authoritative account, of the theoretical and experimental findings in the unconventional computing written by the world leaders in the field. All chapters are self-contains, no specialist background is required to appreciate ideas, findings, constructs and designs presented. This treatise in unconventional computing appeals to readers from all walks of life, from high-school pupils to university professors, from mathematicians, computers scientists and engineers to chemists and biologists.