

F. Hara • R. Pfeifer (Eds.)

Morpho-functional Machines: The New Species

Designing Embodied Intelligence



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Morpho Functional Machines The New Species Designing Embodied Intelligence

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Morpho Functional Machines The New Species Designing Embodied Intelligence:

Morpho-functional Machines: The New Species Fumio Hara,R. Pfeifer,2003-06-05 Morpho functional Machines are a set of tools for investigating the design of embodied intelligence in autonomous bio artifact systems The focus in Morpho functional Machines is on the balance of morphology materials and control intelligent behavior emerges from the interaction of an autonomous system with a real world environment How then should body morphology body materials and sensory systems be designed to achieve a certain set of tasks or desired behaviors in a particular environment This and other questions were addressed at the International Workshop on Morpho functional Machines held in Tokyo in 2001 Collected here are the revised papers from the workshop providing a new perspective for understanding embodied intelligence Presenting the innovative concept of Morpho functional Machines this book is a valuable source for scientists and engineers working in ethnology cognitive sciences robotic engineering and artificial intelligence *Morpho-Functional Machines* Fumio Hara,R. Pfeifer,2014-01-15 **Morpho-functional Machines: The New Species** F. Hara,R. Pfeifer,2011-06-28 Morpho functional Machines are a set of tools for investigating the design of embodied intelligence in autonomous bio artifact systems The focus in Morpho functional Machines is on the balance of morphology materials and control intelligent behavior emerges from the interaction of an autonomous system with a real world environment How then should body morphology body materials and sensory systems be designed to achieve a certain set of tasks or desired behaviors in a particular environment This and other questions were addressed at the International Workshop on Morpho functional Machines held in Tokyo in 2001 Collected here are the revised papers from the workshop providing a new perspective for understanding embodied intelligence Presenting the innovative concept of Morpho functional Machines this book is a valuable source for scientists and engineers working in ethnology cognitive sciences robotic engineering and artificial intelligence **Embodied Artificial Intelligence** Fumiya Iida,Rolf Pfeifer,Luc Steels,Yasuo Kuniyoshi,2004-07-08 Originating from a Dagstuhl seminar the collection of papers presented in this book constitutes on the one hand a representative state of the art survey of embodied artificial intelligence and on the other hand the papers identify the important research trends and directions in the field Following an introductory overview the 23 papers are organized into topical sections on philosophical and conceptual issues information dynamics and morphology principles of embodiment for real world applications developmental approaches artificial evolution and self reconfiguration **Biomimetics** Yoseph Bar-Cohen,2005-11-02 Nature is the world s foremost designer With billions of years of experience and boasting the most extensive laboratory available it conducts research in every branch of engineering and science Nature s designs and capabilities have always inspired technology from the use of tongs and tweezers to genetic algorithms and autonomous legged robots **From Animals to Animats 11** Stephane Doncieux,Benoit Girard,Agnes Guillot,John Hallam,Jean-Arcady Meyer,Jean-Baptiste Mouret,2010-08-11 **Cyberphysical Smart Cities Infrastructures** M. Hadi Amini,Miadreza Shafie-khah,2022-01-06 Learn to deploy novel algorithms to improve

and secure smart city infrastructure In *Cyberphysical Smart Cities Infrastructures Optimal Operation and Intelligent Decision Making* accomplished researchers Drs M Hadi Amini and Miadreza Shafie Khah deliver a crucial exploration of new directions in the science and engineering of deploying novel and efficient computing algorithms to enhance the efficient operation of the networks and communication systems underlying smart city infrastructure The book covers special issues on the deployment of these algorithms with an eye to helping readers improve the operation of smart cities The editors present concise and accessible material from a collection of internationally renowned authors in areas as diverse as computer science electrical engineering operation research civil engineering and the social sciences They also include discussions of the use of artificial intelligence to secure the operations of cyberphysical smart city infrastructure and provide several examples of the applications of novel theoretical algorithms Readers will also enjoy Thorough introductions to fundamental algorithms for computing and learning large scale optimizations control theory for large scale systems Explorations of machine learning and intelligent decision making in cyberphysical smart cities including smart energy systems and intelligent transportation networks In depth treatments of intelligent decision making in cyberphysical smart city infrastructure and optimization in networked smart cities Perfect for senior undergraduate and graduate students of electrical and computer engineering computer science civil engineering telecommunications information technology and business *Cyberphysical Smart Cities Infrastructures* is an indispensable reference for anyone seeking to solve real world problems in smart cities

Evolutionary Computation Wellington Santos, 2009-10-01 This book presents several recent advances on Evolutionary Computation specially evolution based optimization methods and hybrid algorithms for several applications from optimization and learning to pattern recognition and bioinformatics This book also presents new algorithms based on several analogies and metafores where one of them is based on philosophy specifically on the philosophy of praxis and dialectics In this book it is also presented interesting applications on bioinformatics specially the use of particle swarms to discover gene expression patterns in DNA microarrays Therefore this book features representative work on the field of evolutionary computation and applied sciences The intended audience is graduate undergraduate researchers and anyone who wishes to become familiar with the latest research work on this field

Handbook of Research on Synthesizing Human Emotion in Intelligent Systems and Robotics Vallverdú, Jordi, 2014-11-30 Emotions convey significant information through means of natural language analysis embodiment and emotional signing Machines equipped with the ability to experience and interpret emotions perform better in complex environments and share in the emotionally rich social context The *Handbook of Research on Synthesizing Human Emotion in Intelligent Systems and Robotics* presents a solid framework for taking human robot interaction closer to its full potential Presenting a close look at all the factors involved in modeling emotions and applying a thorough understanding of human emotional recognition to technology this volume appeals to active researchers in the fields of artificial emotions artificial intelligence computing robotics philosophy and psychology as well as to students interested in

the research of synthetic emotions Recreating Japanese Men Sabine Fruhstuck, Anne Walthall, 2011-10-04 Recreating Japanese Men is a wonderful and invaluable book Its interdisciplinary mix of essays opens the door to a new world of scholarship on masculinity in Japan David L Howell Harvard University By considering a wide variety of alternative masculinities throughout Japanese history these essays reveal the tensions conflicts and overlapping between competing masculine and feminine ideals and practices in surprising ways Robert A Nye Oregon State University This gallery of striking but also subtle images of Japanese masculinity both reinforces old and reveals new historical understandings of Japanese political and military institutions social divisions and cultural anxieties Essential reading in both Japan and masculinity studies Gary Cross author of Men to Boys The Making of Modern Immaturity **Distributed Autonomous Robotic Systems** Alcherio Martinoli, Francesco Mondada, Nikolaus Correll, Grégory Mermoud, Magnus Egerstedt, M. Ani Hsieh, Lynne E. Parker, Kasper Støy, 2012-09-05 Distributed robotics is a rapidly growing interdisciplinary research area lying at the intersection of computer science communication and control systems and electrical and mechanical engineering The goal of the Symposium on Distributed Autonomous Robotic Systems DARS is to exchange and stimulate research ideas to realize advanced distributed robotic systems This volume of proceedings includes 43 original contributions presented at the Tenth International Symposium on Distributed Autonomous Robotic Systems DARS 2010 which was held in November 2010 at the cole Polytechnique F d rale de Lausanne EPFL Switzerland The selected papers in this volume are authored by leading researchers from Asia Europa and the Americas thereby providing a broad coverage and perspective of the state of the art technologies algorithms system architectures and applications in distributed robotic systems The book is organized into four parts each representing one critical and long term research thrust in the multi robot community distributed sensing Part I localization navigation and formations Part II coordination algorithms and formal methods Part III modularity distributed manipulation and platforms Part IV **From Animals to Animats 17** Oliver Brock, Jeffrey Krichmar, 2024-09-06 This book constitutes the refereed proceedings of the 17th International Conference on Simulation of Adaptive Behavior SAB 2024 held in Irvine CA USA during September 9 12 2024 The 26 full papers included in this book were carefully reviewed and selected from 30 submissions They were organized in topical sections as follows Bio Inspired Navigation Biomimetic Robots Collective Behavior Evolutionary Approaches to Adaptive Behavior Motor Learning and Problem Solving and Decision Making

Bio-Inspired Artificial Intelligence Dario Floreano, Claudio Mattiussi, 2023-04-04 A comprehensive introduction to new approaches in artificial intelligence and robotics that are inspired by self organizing biological processes and structures New approaches to artificial intelligence spring from the idea that intelligence emerges as much from cells bodies and societies as it does from evolution development and learning Traditionally artificial intelligence has been concerned with reproducing the abilities of human brains newer approaches take inspiration from a wider range of biological structures that that are capable of autonomous self organization Examples of these new approaches include evolutionary computation and evolutionary

electronics artificial neural networks immune systems biorobotics and swarm intelligence to mention only a few This book offers a comprehensive introduction to the emerging field of biologically inspired artificial intelligence that can be used as an upper level text or as a reference for researchers Each chapter presents computational approaches inspired by a different biological system each begins with background information about the biological system and then proceeds to develop computational models that make use of biological concepts The chapters cover evolutionary computation and electronics cellular systems neural systems including neuromorphic engineering developmental systems immune systems behavioral systems including several approaches to robotics including behavior based bio mimetic epigenetic and evolutionary robots and collective systems including swarm robotics as well as cooperative and competitive co evolving systems Chapters end with a concluding overview and suggested reading

Neuroconstructivism - II Denis Mareschal, Sylvain Sirois, Gert Westermann, Mark H. Johnson, 2007-01-18 What are the processes from conception to adulthood that enable a single cell to grow into a sentient adult The processes that occur along the way are so complex that any attempt to understand development necessitates a multi disciplinary approach integrating data from cognitive studies computational work and neuroimaging an approach till now seldom taken in the study of child development Neuroconstructivism is a major new 2 volume publication that seeks to redress this balance presenting an integrative new framework for considering development Computer and robotic models provide concrete tools for investigating the processes and mechanisms involved in learning and development Volume 2 illustrates the principles of Neuroconstructivist development with contributions from 9 different labs across the world Each of the contributions illustrates how models play a central role in understanding development The models presented include standard connectionist neural network models as well as multi agent models Also included are robotic models emphasizing the need to take embodiment and brain system interactions seriously A model of Autism and one of Specific Language Impairment also illustrate how atypical development can be understood in terms of the typical processes of development but operating under restricted conditions This volume complements Volume 1 by providing concrete examples of how the Neuroconstructivist principles can be grounded within a diverse range of domains thereby shaping the research agenda in those domains

Neuroconstructivism: Perspectives and prospects Denis Mareschal, 2007 What are the processes from conception to adulthood that enable a single cell to grow into a sentient adult The processes that occur along the way are so complex that any attempt to understand development necessitates a multi disciplinary approach integrating data from cognitive studies computational work and neuroimaging an approach till now seldom taken in the study of child development Neuroconstructivism is a major new 2 volume publication that seeks to redress this balance presenting an integrative new framework for considering development Computer and robotic models provide concrete tools for investigating the processes and mechanisms involved in learning and development Volume 2 illustrates the principles of Neuroconstructivist development with contributions from 9 different labs across the world Each

of the contributions illustrates how models play a central role in understanding development The models presented include standard connectionist neural network models as well as multi agent models Also included are robotic models emphasizing the need to take embodiment and brain system interactions seriously A model of Autism and one of Specific Language Impairment also illustrate how atypical development can be understood in terms of the typical processes of development but operating under restricted conditions This volume complements Volume 1 by providing concrete examples of how the Neuroconstructivist principles can be grounded within a diverse range of domains thereby shaping the research agenda in those domains

Evolutionary Computation in Gene Regulatory Network Research Hitoshi Iba, Nasimul

Noman, 2016-02-23 Introducing a handbook for gene regulatory network research using evolutionary computation with applications for computer scientists computational and system biologists This book is a step by step guideline for research in gene regulatory networks GRN using evolutionary computation EC The book is organized into four parts that deliver materials in a way equally attractive for a reader with training in computation or biology Each of these sections authored by well known researchers and experienced practitioners provides the relevant materials for the interested readers The first part of this book contains an introductory background to the field The second part presents the EC approaches for analysis and reconstruction of GRN from gene expression data The third part of this book covers the contemporary advancements in the automatic construction of gene regulatory and reaction networks and gives direction and guidelines for future research Finally the last part of this book focuses on applications of GRNs with EC in other fields such as design engineering and robotics Provides a reference for current and future research in gene regulatory networks GRN using evolutionary computation EC Covers sub domains of GRN research using EC such as expression profile analysis reverse engineering GRN evolution applications Contains useful contents for courses in gene regulatory networks systems biology computational biology and synthetic biology Delivers state of the art research in genetic algorithms genetic programming and swarm intelligence Evolutionary Computation in Gene Regulatory Network Research is a reference for researchers and professionals in computer science systems biology and bioinformatics as well as upper undergraduate graduate and postgraduate students Hitoshi Iba is a Professor in the Department of Information and Communication Engineering Graduate School of Information Science and Technology at the University of Tokyo Tokyo Japan He is an Associate Editor of the IEEE Transactions on Evolutionary Computation and the journal of Genetic Programming and Evolvable Machines Nasimul Noman is a lecturer in the School of Electrical Engineering and Computer Science at the University of Newcastle NSW Australia From 2002 to 2012 he was a faculty member at the University of Dhaka Bangladesh Noman is an Editor of the BioMed Research International journal His research interests include computational biology synthetic biology and bioinformatics

Symbiotic Multi-Robot Organisms Paul Levi, Serge Kernbach, 2010-05-18 This book examines the evolution of self organised multicellular structures and the remarkable transition from unicellular to multicellular life It shows the way forward in developing new robotic

entities that are versatile cooperative and self configuring

Performance Evaluation and Benchmarking of Intelligent Systems Raj Madhavan,Edward Tunstel,Elena Messina,2010-04-29 To design and develop capable dependable and affordable intelligent systems their performance must be measurable Scientific methodologies for standardization and benchmarking are crucial for quantitatively evaluating the performance of emerging robotic and intelligent systems technologies There is currently no accepted standard for quantitatively measuring the performance of these systems against user defined requirements and furthermore there is no consensus on what objective evaluation procedures need to be followed to understand the performance of these systems The lack of reproducible and repeatable test methods has precluded researchers working towards a common goal from exchanging and communicating results inter comparing system performance and leveraging previous work that could otherwise avoid duplication and expedite technology transfer Currently this lack of cohesion in the community hinders progress in many domains such as manufacturing service healthcare and security By providing the research community with access to standardized tools reference data sets and open source libraries of solutions researchers and consumers will be able to evaluate the cost and benefits associated with intelligent systems and associated technologies In this vein the edited book volume addresses performance evaluation and metrics for intelligent systems in general while emphasizing the need and solutions for standardized methods To the knowledge of the editors there is not a single book on the market that is solely dedicated to the subject of performance evaluation and benchmarking of intelligent systems

Plant Electrophysiology Alexander G. Volkov,2012-05-03 This book written by the leading experts in the field of plant electrophysiology provides a comprehensive and up to date overview of the current state of knowledge on electrical signaling and responses in plant physiology It covers a significant interdisciplinary area for a broad range of researchers emphasizing the physical chemical biological and technological aspects of plant electrophysiology while also demonstrating the role of electrochemical processes and ion channels in plant life cycles Separate chapters describe the electrophysiology of the Venus flytrap the Telegraph plant Mimosa pudica and other interesting plant species Subsequent sections focus on mechanisms of plant movement the role of ion channels morphing structures and the effects of electrical signal transduction on photosynthesis and respiration Further topics include the electrophysiology of plant insect interactions how plants sense different environmental stresses and stimuli and how phytoactuators respond to them All chapters analyze the generation and transmission of electrical signals in plants

Soft Robotics for Medical and Healthcare Applications Shaik Himam Saheb,Tharakeshwar Appala,Mohammad S Khan,2025-06-25 Soft robotics is an emerging field that involves the development and application of robots and robotic systems made from soft and flexible materials *Soft Robotics for Medical and Healthcare Applications* discusses the use of soft robotics in minimally invasive vascular surgery for clubfoot and filariasis leg The title Discusses soft robot design which is helpful for researchers and students to design the mechanisms for problems like filariasis leg and personalized rehabilitation devices Covers metal additive manufacturing

processes used for soft robot parts printing Explains design actuation manufacturing and analysis of soft robots for healthcare applications Explores 3D and 4D printing for soft robotics data driven soft robotics and the use of soft robotics in drug delivery Presents case studies including the creation of custom filarisis limbs and the application of soft robots in minimally invasive vascular surgery The text is primarily written for senior undergraduates graduate students and academic researchers in fields including electrical engineering electronics and communications engineering computer engineering and biomedical engineering

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