



# ROBOT SHAPING

AN EXPERIMENT IN BEHAVIOR ENGINEERING

MARCO DORIGO AND MARCO COLOMBETTI

# Robot Shaping An Experiment In Behavior Engineering

**William Lidwell, Kritina Holden, Jill  
Butler**



## **Robot Shaping An Experiment In Behavior Engineering:**

Robot Shaping Marco Dorigo, Marco Colombetti, 1998 foreword by Lashon Booker To program an autonomous robot to act reliably in a dynamic environment is a complex task The dynamics of the environment are unpredictable and the robots sensors provide noisy input A learning autonomous robot one that can acquire knowledge through interaction with its environment and then adapt its behavior greatly simplifies the designer's work A learning robot need not be given all of the details of its environment and its sensors and actuators need not be finely tuned Robot Shaping is about designing and building learning autonomous robots The term shaping comes from experimental psychology where it describes the incremental training of animals The authors propose a new engineering discipline behavior engineering to provide the methodologies and tools for creating autonomous robots Their techniques are based on classifier systems a reinforcement learning architecture originated by John Holland to which they have added several new ideas such as mutesspec classifier system energy and dynamic population size In the book they present Behavior Analysis and Training BAT as an example of a behavior engineering methodology *Learning Classifier Systems* Pier L. Lanzi, Wolfgang Stolzmann, Stewart W. Wilson, 2003-06-26 Learning Classifier Systems LCS are a machine learning paradigm introduced by John Holland in 1976 They are rule based systems in which learning is viewed as a process of ongoing adaptation to a partially unknown environment through genetic algorithms and temporal difference learning This book provides a unique survey of the current state of the art of LCS and highlights some of the most promising research directions The first part presents various views of leading people on what learning classifier systems are The second part is devoted to advanced topics of current interest including alternative representations methods for evaluating rule utility and extensions to existing classifier system models The final part is dedicated to promising applications in areas like data mining medical data analysis economic trading agents aircraft maneuvering and autonomous robotics An appendix comprising 467 entries provides a comprehensive LCS bibliography **Universal Principles of Design, Updated and Expanded Third Edition** William Lidwell, Kritina Holden, Jill Butler, 2023-05-09 Universal Principles of Design Completely Updated and Expanded Third Edition is a comprehensive cross disciplinary encyclopedia now with fully updated references for existing entries and expanded with 75 new entries to present a total of 200 laws guidelines and considerations that are important to successful design Richly illustrated and easy to navigate this essential design guide pairs clear explanations of every design concept with visual examples of the ideas applied in practice Whether a marketing campaign or a museum exhibit a video game or a complex control system the design we see is the culmination of many concepts and practices brought together from a variety of disciplines Because no one can be an expert on everything designers have always had to scramble to find the information and know how required to make a design work until now Each principle is presented in a two page format The first page contains a succinct definition and a full description of the principle examples of and guidelines for its use and side notes that provide

elaborations and references The second page contains visual examples and related graphics to support a deeper understanding of the principle The book is organized alphabetically so that principles can be easily and quickly referenced by name From 3D Projection to the Zeigarnick Effect every major design concept is defined and illustrated including these new additions Feature creep Gamification Root cause Social trap Supernormal stimulus A landmark reference for designers engineers architects and students Universal Principles of Design has become the standard for anyone seeking to broaden and improve their design expertise explore brainstorming ideas and improve the quality of their design work The titles in the Rockport Universal series offer comprehensive and authoritative information and edifying and inspiring visual examples on multidisciplinary subjects for designers architects engineers students and anyone who is interested in expanding and enriching their design knowledge

**Universal Principles of Design, Revised and Updated** William Lidwell, Kritina Holden, Jill Butler, 2010 Universal Principles of Design is the first comprehensive cross disciplinary encyclopedia of design

**Advances in Learning Classifier Systems** Pier L. Lanzi, Wolfgang Stolzmann, Stewart W. Wilson, 2003-07-31 Learning classifier systems are rule based systems that exploit evolutionary computation and reinforcement learning to solve difficult problems They were introduced in 1978 by John H Holland the father of genetic algorithms and since then they have been applied to domains as diverse as autonomous robotics trading agents and data mining At the Second International Workshop on Learning Classifier Systems IWLCS 99 held July 13 1999 in Orlando Florida active researchers reported on the then current state of learning classifier system research and highlighted some of the most promising research directions The most interesting contributions to the meeting are included in the book Learning Classifier Systems From Foundations to Applications published as LNAI 1813 by Springer Verlag The following year the Third International Workshop on Learning Classifier Systems IWLCS 2000 held September 15 16 in Paris gave participants the opportunity to discuss further advances in learning classifier systems We have included in this volume revised and extended versions of thirteen of the papers presented at the workshop

*Robots* Daniel Ichbiah, 2005 Presents an overview of the history of the robot culled from interviews with experts such as scientists surgeons manufacturers science fiction writers artists filmmakers and provides information on the role they play in daily life and speculates on their future

Machine Learning Jude Shavlik, 1998

*Sensor Fusion and Decentralized Control in Robotic Systems II* G. T. McKee, Paul S. Schenker, 1999 This work presents a series of papers examining various aspects of sensor fusion and decentralized control in robotic systems

*Mobile Robots*, 1999

**Intelligent Systems Report**, 1998 Proceedings, 2004

**Genetic Programming** John R. Koza, 1998 Proceedings of the Annual Conferences on Genetic Programming These proceedings present the most recent research in the field of genetic programming as well as recent research results in the fields of genetic algorithms artificial life and evolution strategies DNA computing evolvable hardware and genetic learning classifier systems

*1999 Eusflat-Estylf Joint Conference* Gaspar Mayor, Jaume Suñer, 1999

FUZZ-IEEE '99 IEEE Neural Networks Council, 1999 The proceedings of the

1999 IEE International Fuzzy Systems Conference cover a wide range of aspects of control systems engineering

Advances in Applied Artificial Intelligence John Fulcher, 2006 This book explores artificial intelligence finding it cannot simply display the high level behaviours of an expert but must exhibit some of the low level behaviours common to human existence Provided by publisher     *Intelligent Information Technologies* Vijayan Sugumaran, 2008 This collection compiles research to drive further evolution and innovation of these next generation technologies and their applications of which the scientific technological and commercial communities have only begun to scratch the surface It is an essential reference acquisition for any library seeking to cover the leading edge of technological innovations Provided by publisher     *Genetic and Evolutionary Computation Conference* , 2005     *Intelligent Autonomous Systems 8* Frans Groen, 2004 Intelligent Autonomous systems are beginning to enter our daily life in ambient intelligence applications These systems can directly sense and act in their own environment without demanding detailed supervision from humans Many new challenges are emerging to create systems that can operate and interact in human inhabited environments The goal of IAS 8 is to exchange and stimulate research ideas about how to bring active intelligent systems into our daily lives This publication contains an excellent selection of papers that shows the research of autonomous systems today Subjects discussed are the designing of autonomous agents Artificial Emotional Creatures and Multi Robot Coordination in Highly Dynamic Environments

*GECCO 2005* Hans-Georg Beyer, 2005     **Proceedings 2002 IEEE/RSJ International Conference on Intelligent Robots and Systems** , 2002

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