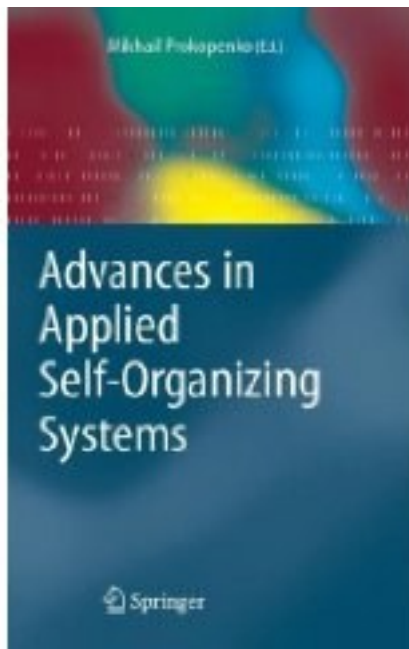


Advances in Applied Self-organizing Systems



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The main challenge faced by designers of self-organizing systems is how to validate and control non-deterministic dynamics. Over-engineering the system may completely suppress self-organization with an outside influence, eliminating emergent patterns and decreasing robustness, adaptability and scalability. Whilst leaving too much non-determinism in the system's behaviour may make its verification and validation almost impossible. This book presents the state-of-the-practice in successfully engineered self-organizing systems, and examines ways to balance design and self organization in the context of applications.

As demonstrated throughout, finding this balance helps to deal with diverse practical challenges. The book begins with the more established fields of traffic management

and structural health monitoring, building up towards robotic teams, solving challenging tasks deployed in tough environments. The second half of the book follows with a deeper look into the micro-level, and considers local interactions between agents. These interactions lead towards self-modifying digital circuitry and self-managing grids, self-organizing data visualization and intrusion detection in computer networks, immunocomputing and nature-inspired computation, and eventually to artificial life. The case studies described illustrate the richness of the topic and provide guidance to its intricate areas.

Many algorithms proposed and discussed in this volume are biologically inspired and readers will also gain an insight into cellular automata, genetic algorithms, artificial immune systems, snake-like locomotion, ant foraging, birds flocking and mutualistic biological ecosystems, amongst others. Demonstrating the practical relevance and applicability of self-organization, this book will be of interest to advanced students and researchers in a wide range of fields.

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