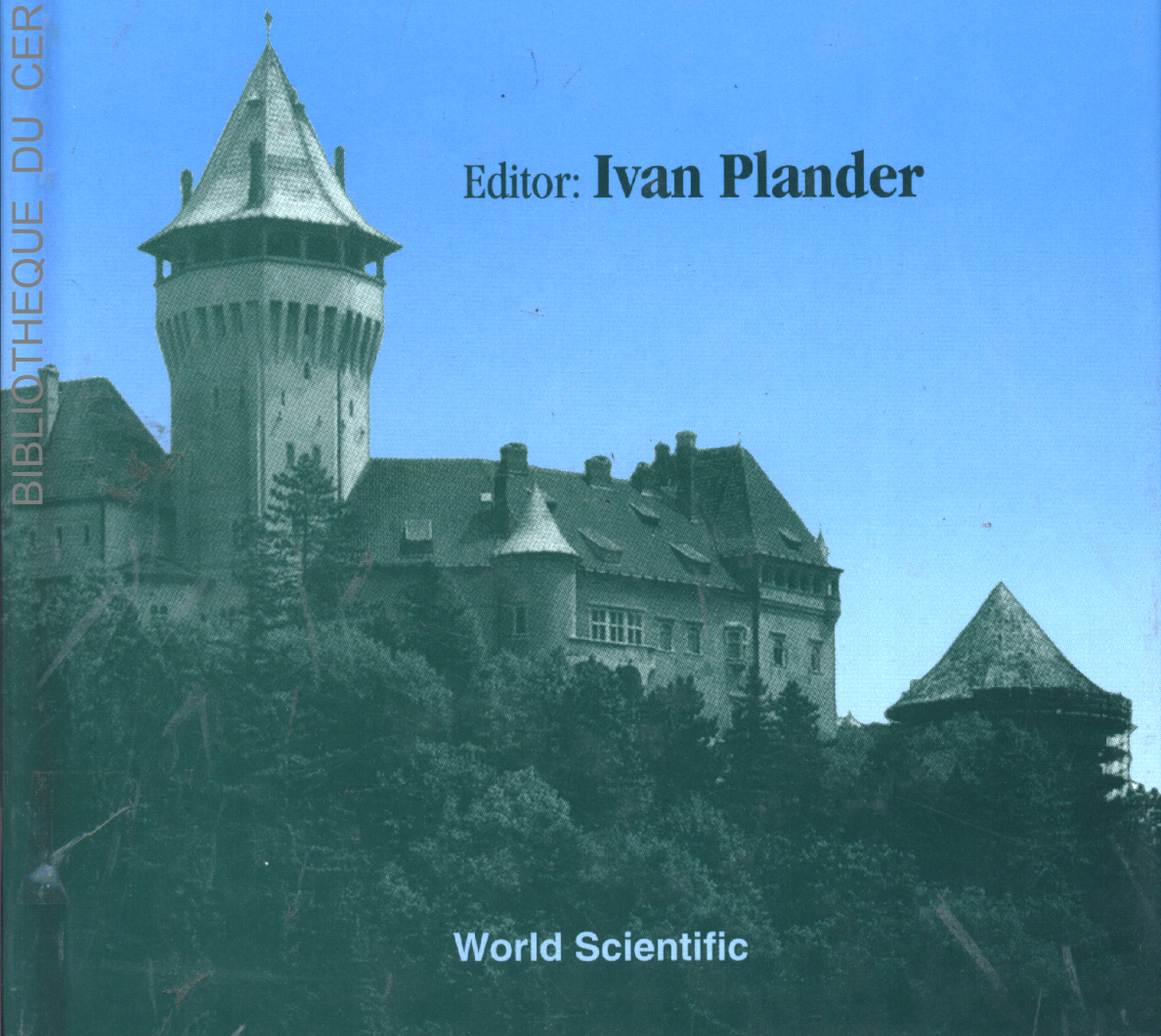
Proceedings of the Seventh International Conference on
Artificial Intelligence and Information-Control Systems of Robots

ARTIFICIAL INTELLIGENCE AND INFORMATION-CONTROL SYSTEMS OF ROBOTS '97

Editor: **Ivan Plander**



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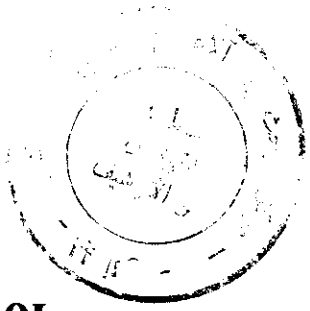

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Also published by World Scientific:

Artificial Intelligence and Information-Control Systems of Robots '94
(Proceedings of the Sixth International Conference on Artificial Intelligence and Information-Control Systems of Robots)
Edited by Ivan Plander

Proceedings of the Seventh International Conference on
Artificial Intelligence and Information-Control Systems of Robots

ARTIFICIAL INTELLIGENCE AND INFORMATION-CONTROL SYSTEMS OF ROBOTS '97

Smolenice Castle, Slovakia Sep 10 – 14 , 1997

Editor

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Bratislava, Slovakia

World Scientific
Singapore • New Jersey • London • Hong Kong

Published by

World Scientific Publishing Co. Pte. Ltd.

P O Box 128, Farrer Road, Singapore 912805

USA office: Suite 1B, 1060 Main Street, River Edge, NJ 07661

UK office: 57 Shelton Street, Covent Garden, London WC2H 9HE

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library.

ARTIFICIAL INTELLIGENCE AND INFORMATION-CONTROL SYSTEMS OF ROBOTS '97
Proceedings of the Seventh International Conference on Artificial Intelligence and Information-Control Systems of Robots

ISBN 981-02-3235-7

This book is printed on acid-free paper.

Printed in Singapore by Uto-Print

Seventh International Conference on
Artificial Intelligence and Information-Control Systems of Robots
Smolenice Castle, September 10-14, 1997

organized by

Slovak Academy of Sciences
Institute of Computer Systems
Institute of Control Theory and Robotics
Institute for Informatics

and

Scientific Board for Artificial Intelligence of the Russian Academy of Sciences

in cooperation with

Slovak Society for Applied Cybernetics and Informatics

The Conference is sponsored by a grant of the
European Commission,
Directorate-General III Industry, RTD: Information Technologies

PREFACE

This volume contains the written version of talks presented during the International Conference on Artificial Intelligence and Information-Control Systems of Robots (AIICSR'97), held at the Smolenice Castle, Slovakia, in September 10-14, 1997. The Conference was organized jointly by the Institute of Computer Systems and the Institute of Control Theory and Robotics of the Slovak Academy of Sciences in cooperation with the Scientific Board for Artificial Intelligence of the Russian Academy of Sciences and the Slovak Society for Applied Cybernetics and Informatics.

AIICSR'97 as one of the most traditional East/West professional meetings devoted to artificial intelligence (AI) and its application in robotics organized in 1980, 1982, 1984, 1989 and 1994 in Slovakia. The aim of the Conference is in providing comfortable conditions of the Smolenice Castle for fruitful and valuable exchange of ideas concerning the problems of artificial intelligence and related fields, and their impact on advanced robotics and knowledge processing.

The AIICSR'97 Conference was devoted both to theoretical and applicative aspects of artificial intelligence and robotics, as the most important representative of AI applications, primarily in mobile robots. Special attention is paid to cooperating distributed AI, and very significant results are presented in the field of fundamental studies in computer vision and other topics.

The program of the Conference as well as the contents of these Proceedings have been divided into three main parts containing the presented position papers, invited talks, and submitted papers, respectively.

Position papers start with the paper by I.V. Ezhkova presenting a broad panorama of the highly topical tendency of present-day artificial intelligence research to borrow, test, and adapt techniques from various other fields. Important new topics are knowledge discovery and data mining (KDD) and study of context. In addition to robots, AI has created softbots, software robots working in complex information environment. The World Wide Web becomes the most exciting and challenging application of AI.

B. Frankovič, borrowing conceptual tools from the theory of Petri nets and Markov processes, presents some solutions of problems connected with modelling, simulation, scheduling, and control of an automated flexible manufacturing system.

The contribution by J. Kelemen overviews a formal framework - based on the theory of formal grammars and grammar systems - for dealing with so-called reactive systems, both a fashionable and perspective way of autonomous agents study and development.

I. Plander surveys the development of parallel and distributed computer architectures, which runs under considerable influence of artificial intelligence. The main emphasis is put on MIMD and SIMD architectures as well as on

cooperating distributed computer systems in their relation to programming intelligent systems, and to their relation to evolving field of multi-agent systems.

G. Rossi deals with a way to make the declarative style of programming more effective. He describes the main facilities for set designation and manipulation offered by programming languages, particularly by those based on the idea of logic programming with sets.

A considerably influential development line of studying evolution of social laws in artificial societies of agents is overviewed in the contribution by M. Tennenholtz. He constructively argues that new coordination theories should be introduced in order to successfully address the problem of designing efficient multi-agent systems.

The section of position papers ends with T. Vámos's essay discussing the eternal mind-machine problem starting with Aristotle, and more and more topical nowadays - "can a robot ever replace man, and in what sense?" looking for an answer based on our latest experience with artificial intelligence, and our relatively stable philosophy, ethics, and general mankind habitus, as well.

The section of five invited papers starts with P. Brézillon's survey of the role of context in artificial intelligence with recognized emphasis put on the context dimension of knowledge representation, reasoning, and man-machine interactions.

I. Fermin et al. deal with computer vision. They present an original algorithm for motion estimation and reconstruction using randomization instead of predetermination of point correspondence developed at Chiba University, Japan.

A theoretical framework for achievement of the best quality of the state estimation in dynamical systems is presented in the contribution by B.M. Miller. The framework is used for observations of partly observable linear and discrete-continuous stochastic systems.

The theoretical framework of fuzzy logic is used for intelligent control of an autonomous robot called LAMOR in the contribution by O. Manolov et al. The developing team is formed from associates of the Bulgarian and Slovak Academies of Sciences.

The last invited paper - an extended abstract by M. Thielscher - is devoted to action theories providing a formalism to represent and reason about domains in which the execution of actions plays a dominant role. The author concentrates particularly on the frame problem, the qualification problem, and the ramification problem.

The submitted papers collected in the third part of the Proceedings reflect, in a sense, the stratification of professional attention devoted to particular branches of research in artificial intelligence.

Five submitted papers - those by M. Bieliková and P. Návrat, F. Čapkovič, I. Iancu, F. Sebastiani, and J. Šajda - are devoted to the theoretical as well as

applicative aspects of the traditional problem of knowledge representation and processing.

The same number of papers - by D. Janglová and L.T. Uher, V. Kalaš and E. Gers, J. Kardoš and L. Jurišica, A, Koschan, and V.S. Sgurev and V.S. Jotsov - are on different problems connected with deliberative robotics.

Four papers - by M. Addibpour and E. Tyugu, L. Hluchý et al., R. Kühnel, and M. Liday - deal with (societies of) agents.

Three papers - by V. Olej, J. Štefanovič and E. Gramatová, and P. Sosík - are devoted to genetic algorithms and neural nets.

The list of topics is completed by natural language processing (the paper by S. Daržágín and M. Trnka concerning fundamental results in computer vision), surface analysis and an application of the shortest path problem (the papers by G. Podhájecký et al., and B. Zaťko), case-based reasoning in an application domain (the paper by A.P. Urbański).

It is a duty, as well as a pleasure of the Editor, to express his gratitude to the members of the Conference Program Committee for their valuable work. On behalf of the Program Committee as well as on his own, the Editor would like to thank everyone who has contributed to these Proceedings, as well as to the Organizing Committee of the Conference. Our thanks go also to all those who submitted numerous valuable papers, as well as to all of the participants of the Conference. Special thanks are to be expressed to the European Commission, DG III, Industry, RTD: Information Technologies for the grant which supported the realization of this Conference. Last but not least, our thanks go to the World Scientific Publishing Company for excellent cooperation in publishing these Proceedings.

Bratislava, May 1997

Ivan Plander
Editor

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