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The series “Advances in Intelligent Systems and Computing” contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing.

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Jun Wang, The Chinese University of Hong Kong, Shatin, Hong Kong
e-mail: jwang@mae.cuhk.edu.hk
Foreword

Broadly perceived control, automation, robotics and measuring techniques belong to the most relevant fields of science and technology, both from the point of view of theoretical challenges and practical importance. In spite of being separate areas of research, knowledge and expertise, they are strongly related, both in terms of paradigms and tools and techniques employed, as well in terms of their industrial scope of applications. Therefore, an industrial, practice oriented perspective is an important aspects of those areas. Moreover, automation, robotics and measuring techniques have a significant innovative potential as the current industrial practice calls for a further integration of all kinds of production systems, more ecological and energy efficient solutions as well as cost and time effective production and manufacturing processes.

Among many important problems and challenges faced by automation and control, most of which have been reflected in the scope of the papers included in this volume, one can mention, for instance, discrete systems, actuators, diagnostics, and modern tools exemplified by fuzzy logic, evolutionary computation, neural networks, probabilistic approaches, etc.

In robotics, in particular in its part related to the development of mobile robots, one can quote as crucial problems and challenges various problem solving tasks related to the control of walking robots, control of manipulators, motors and drivers, mechatronic systems, and tracking control.

Measuring techniques and systems have to overcome, first of all, barriers implied by environmental conditions and limitations. They call for the development of novel sensors (also utilizing novel materials such as graphene), advanced signal processing and a more foundational development focused on the theory of metrology.

This book presents the recent advances and developments in control, automation, robotics, and measuring techniques that are trying to meet those challenges and to fulfil those technological, economic and social needs. It presents contributions of top experts in the fields, focused on both theory and industrial practice. The particular chapters present a deep analysis of a specific technical problem which is in general followed by a numerical analysis and simulation, and results of an implementation for the solution of a real world problem.
We strongly believe that the presented theoretical results, practical solutions and guidelines will be useful for both researchers working in the area of engineering sciences and for practitioners solving industrial problems.

Warsaw

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Roman Szewczyk
Cezary Zieliński
Małgorzata Kaliczyńska
Editors

Professor Roman Szewczyk received both his Ph.D. and D.Sc. in the field of mechatronics. He is specializing in the modelling of properties of magnetic materials as well as in sensors and sensor interfacing, in particular magnetic sensors for security applications. He is the leading the development of a sensing unit for a mobile robot developed for the Polish Police Central Forensic Laboratory and of methods of non-destructive testing based on the magnetoelastic effect. Professor Szewczyk was involved in over 10 European Union funded research projects within the FP6 and FP7 as well as projects financed by the European Defence Organization. Moreover, he was leading two regional and national scale technological foresight projects and was active in the organization and implementation of technological transfer between companies and research institutes. Roman Szewczyk is Secretary for Scientific Affairs in the Industrial Research Institute for Automation and Measurements (PIAP). He is also Associate Professor at the Faculty of Mechatronics, Warsaw University of Technology and a Vice-chairman of the Academy of Young Researchers of the Polish Academy of Sciences.

Professor Cezary Zielinski received his M.Sc./Eng. degree in control in 1982, Ph.D. degree in control and robotics in 1988, the D.Sc. (habilitation) degree in control and robotics in 1996, all from the Faculty of Electronics and Information Technology, Warsaw University of Technology, Warsaw, Poland, and Full Professorship in 2012. Currently he is Full Professor both in the Industrial Research Institute for Automation and Measurement (PIAP) and the Warsaw University of Technology, where he is Director of the Institute of Control and Computation Engineering. Since 2007 he has been a member of the Committee for Automatic Control and Robotics, the Polish Academy of Sciences. Professor Zielinski is Head of the Robotics Group in the Institute of Control and Computation Engineering working on robot control and programming methods. His research interests focus on robotics in general and in particular include: robot programming methods, formal approach to the specification of architectures of multi-effector and multi-receptor systems, robot kinematics, robot position-force control, visual servo control, and design of digital circuits. He is the author/coauthor of over 160 conference and journal papers as well as books concerned with the above mentioned research subjects.
Dr. Małgorzata Kaliczyńska received her M.Sc./Eng. degree in cybernetics from the Faculty of Electronics, Wrocław University of Technology, and her Ph.D. degree in the field of fluid mechanics from the Faculty of Mechanical and Power Engineering in this same university. Now she is Assistant Professor in the Industrial Research Institute for Automation and Measurement (PIAP) and Editor of the scientific and technological magazine “Measurements, Automation, Robotics”. Her areas of research interest include distributed control systems, information retrieval and webometrics.
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