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Volume 1427

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Roman Szewczyk · Cezary Zieliński ·
Małgorzata Kaliczyńska
Editors

Automation 2022: New Solutions and Technologies for Automation, Robotics and Measurement Techniques

Springer

Editors
Roman Szewczyk
Łukasiewicz Research Network – Industrial Research Institute for Automation and Measurements PIAP
Warsaw, Poland

Cezary Zieliński
Łukasiewicz Research Network – Industrial Research Institute for Automation and Measurements PIAP
Warsaw, Poland

Małgorzata Kaliczyńska
Łukasiewicz Research Network – Industrial Research Institute for Automation and Measurements PIAP
Warsaw, Poland

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Foreword

In 1992, American political scientist Francis Fukuyama published the book "The End of History and the Last Man." He presented the idea of the final universalization of Western liberal democracy worldwide as the final and stable form of economic and political evolution. Despite the fact that Fukuyama's ideas were commonly accepted for decades, we now observe a breakdown of stable global political environment. During the last years, due to the COVID-19 pandemic and the increase of political tensions, we have faced unexpected and devastating military actions in Europe.

As a result, the global economy is devastated and significantly disrupted in its key areas, causing the risk of poverty and social unrest for a large part of the world population. Now, our economy requires urgent reorganization and further automatization of production, delivery chains, and services to respond to those problems. This reorganization has to lead to a radical increase in efficiency of resource use and the robustness of global production in an unstable environment. In addition, security and defense technologies seem to become the focal point of recent technological development.

This volume presents the result of discussions among interdisciplinary specialists tackling recent industrial and economic challenges. It contains 38 papers authored by both scientists and practitioners focused on an interdisciplinary approach to developing measuring techniques, robotic and mechatronic systems, industrial automation, numerical modeling and simulation, as well as application of artificial intelligence techniques required by the transformation leading to Industry 4.0. We strongly believe that the solutions and guidelines presented in this volume will be useful to both researchers and engineers facing problems associated with developing cyber-physical systems for global development. As a result, we expect to give input to reconstructing the world economy, which is still suffering from the pandemic and military upheaval, and lead it to further stable development and prosperity.

February 2022

Roman Szewczyk
Cezary Zieliński
Małgorzata Kaliczyńska

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About the Editors

Prof. Roman Szewczyk received both his PhD and DSc in the field of mechatronics. He specializes in modeling of properties of magnetic materials as well as in sensors and sensor interfacing, in particular magnetic sensors for security applications. He leads the development of: a sensing unit for a mobile robot developed for the Polish Police Central Forensic Laboratory, and methods of nondestructive testing based on magnetoelastic effect. Professor Szewczyk has been 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 has led 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 Vice-chairman of the Academy of Young Researchers of the Polish Academy of Sciences.

Prof. Cezary Zieliński received his M.Sc./Eng., Ph.D. and habilitation degrees in control and robotics from the Faculty of Electronics and Information Technology, Warsaw University of Technology (WUT), Warsaw, Poland. He is Full Professor of WUT, Head of the Robotics Research Group, Director of the Institute of Control and Computation Engineering and Professor of Industrial Research Institute for Automation and Measurement PIAP. His research concentrates 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 Author/Co-author of over 200 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 the 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, Internet of Things, Industry 4.0, information retrieval and webometrics.