The main motivation in publishing this collection of papers is to present the most recent results concerning robot motion and control to the robotics community. Twenty five original works have been selected out of 53 papers presented at the Fourth International Workshop on Robot Motion and Control (RoMoCo’04) which was held in Puszczykowo, Poland, during four days from June 17 to 20, 2004. This Workshop was the fourth in a series of RoMoCo Workshops held so far (the previous ones were held in 1999, 2001, and 2002). It is an internationally recognized event, technically co-sponsored by the IEEE Robotics and Automation Society and the Polish Section of the IEEE Robotics and Automation Society Chapter. Its 2004 edition was also technically supported by the thematic network CLAWAR (Climbing and Walking Robots). The Workshop was organized by the Institute of Control and Systems Engineering of the Poznań University of Technology in Poland.

During the Workshop the members of the International Program Committee suggested to select the most interesting papers presented at RoMoCo’04. The authors were asked to prepare extended versions of their papers using only up to 25% of the original content published in the Proceedings of the Fourth International Workshop on Robot Motion and Control printed by the Poznań University Press and distributed during RoMoCo’04. The selected papers went through a rigorous review procedure and most of them got two reviews. Based on the reviewers’ comments most of the papers were corrected and finally accepted for publication in the Lecture Notes in Control and Information Sciences series.

The interest in robot motion and control has remarkably augmented over recent years. Novel solutions of complex mechanical systems such as industrial robots, mobile robot, flying robots and their applications are the evidence of a significant progress in the area of robotics. It should also be noted that among the objectives of running the Workshop was to build a bridge between previous the Eastern European countries and the Western countries. It is one of the reasons why RoMoCo’04 took place in Poland. There is a lot of appreciation of the robotics field in Poland now and many researchers visiting Poland have noticed this fact recently.

To our best knowledge there are no books available at present which refer to the most recent advances in robot motion and control and this book fills the
gap. There are standard text books concerning this subject which are available at the market which are four years old. The dynamically developing field of robot control, in particular control of nonholonomic systems and legged robots as well as trajectory planning for these systems is not covered in any text book published so far. Therefore we strongly believe that this proposition is unique and no similar collection of papers has been published before. A careful review procedure resulted in the selection of high quality papers written by internationally recognized scientists as well as young talented researchers (some of them Ph.D. students) from different countries. Our goal was to encourage young scientists to contribute to this book showing that many new research groups are being set up throughout the world. This book should strengthen the relationship between the new and old members of the European Community.

The members of the International Program Committee have worked in the area of robotics and automation for many years. They have experience in various fields of robotics and basically have worked on control theory with applications to robotics for many years. They took active part in the reviewing procedure during last months when this book was being built up.

This book consists of five parts. The first part deals with control and trajectory planning of nonholonomic systems. It is the longest one and contains five papers. The second part is devoted to control of mechanical systems. Here by mechanical systems we mean industrial robots, flexible link robots, and flying robots. In this part six papers were selected. The third part addresses climbing and walking robots, which can also be considered mechanical systems. However, climbing and walking are addressed explicitly, which is reflected in the part’s title. Four papers constitute this part. Part four is dedicated to important ideas originating in the area of mobile robot research. Of the five papers contained here, three deal with multiagent systems and two with localization methods. Finally, the last part consisting of five papers is dedicated to application of robotic systems.

The book is addressed to Ph.D. students of robotics and automation, informatics, mechatronics and production engineering systems. It will also be of interest to scientists and researchers working in the above fields.

I would like to take this opportunity to thank all the reviewers involved in the reviewing process. I am very grateful to Mr K. Romanowski for this suggestions concerning improvement of English. I am also grateful to Dr W. Wróblewski for his help and patience and typesetting of this book.

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Krzysztof Kozłowski
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