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Manuel Ferre, Martin Buss, Rafael Aracil,
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Advances in Telerobotics

 Springer

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Foreword

At the dawn of the new millennium, robotics is undergoing a major transformation in scope and dimension. From a largely dominant industrial focus, robotics is rapidly expanding into the challenges of unstructured environments. Interacting with, assisting, serving, and exploring with humans, the emerging robots will increasingly touch people and their lives.

The goal of the new series of *Springer Tracts in Advanced Robotics (STAR)* is to bring, in a timely fashion, the latest advances and developments in robotics on the basis of their significance and quality. It is our hope that the wider dissemination of research developments stimulates exchanges and collaborations among the research community and contributes to further advancement of this rapidly growing field.

The edited volume by Manuel Ferre, Martin Buss, Rafael Aracil, Claudio Melchiorri and Carlos Balaguer is focused on the most recent advances in telerobotics, a technology that deals with the inclusion of a human operator in the control loop of a remote robot. Telerobotics encompasses an area at the crossroads of several scientific disciplines such as mechatronics, control, communication, computers, sensor-based recognition, multimodality and even teleoperation through Internet.

The material is organised in twenty-eight chapters by well-recognised authors in the field, which are grouped in three main parts on human system interfaces, control, and applications. The introduction by the editors provides a useful reading guide throughout the contents of the book, thanks to an effective table of topics and keywords for each part. A number of problems and solutions of today's research on telerobotics are addressed, with emphasis on methods, techniques, experimental results, and developments. Remarkably, the volume is accompanied by a collection of videos illustrating several practical applications of telerobotics.

As the first focused STAR volume in the broad area of telerobotics, this title constitutes a fine addition to the series!

Naples, Italy
January 2007

Bruno Siciliano
STAR Editor

Preface

The main purpose of this book is to provide readers with recent advances in the field of Telerobotics. It describes methods, experimental results, applications, and developments, highly relevant for scientists, researchers, and students in Teleoperation.

In its broadest sense Telerobotics may be defined as the technology that deals with the inclusion of a human operator in the control loop of a remote robot. Many scientific disciplines are to contribute to the area of telerobotics: mechatronics, control, communication, engineering, computer science, speech/gesture/image recognition, psychology (psychophysics), etc. Multimodality – vision, audio, haptics – and teleoperation through the Internet are important contemporary issues.

This book is structured in three parts: I. Human System Interfaces, II. Control, and III. Applications. Chapters in part I concentrate on human interface technology which allows a human operator to close the control loop of a remote robot. Topics related to control algorithms - in particular for the case with time delay in the communication network - are the focus in part II, concentrating on bilateral control methods. Part III presents a variety of advanced applications in surgery, space, and other fields relevant to everyday life. The book is complemented by a CD containing fifteen research videos, which make the contents of the book even more descriptive. This collection of videos can also be found at www.lsr.ei.tum.de/telerobotics.

The editors would like to thank all the authors for their valuable contributions to this book. The quality and freshness found in each chapter are due to the excellent work carried out by the authors. In addition we would like to offer our special thanks to the junior researchers who have made large parts of their PhD theses available in the chapters of this volume.

Spain, Germany, Italy
January 2007

Manuel Ferre
Martin Buss
Rafael Aracil
Claudio Melchiorri
Carlos Balaguer

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