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By Pedro Sanz

Robotics: Modeling, Planning, and Control

B. Siciliano, L. Sciavicco, L. Villani, and G. Oriolo, Springer-Verlag, 2009. ISBN: 978-1-84628-641-4

This book is a greatly extended and revised version of an earlier book in the series Modeling and Control of Robot Manipulators (2000, ISBN: 978-1-85233-221-1). However, the classic text on robot manipulators now covers visual control, motion planning, and mobile robots.

The full scope of robotics lies at the intersection of mechanics, electronics, signal processing, control engineering, and computing and mathematical modeling. However, within this very broad framework, the authors have pursued the themes of modeling, planning, and control. These are, and will remain, fundamental aspects of robot design and operation for years to come. Some interesting innovations in this text include material on wheeled robots and on vision as used in the control of robots. Thus, the book provides a thorough theoretical grounding in an area where the technologies are evolving and developing in new applications.

The text develops around a core of consistent and rigorous formalism with fundamental and technological material giving rise naturally and with gradually increasing difficulty to more advanced considerations.

Appendices ensure that students will have access to a consistent level of background in basic areas such as rigid-body mechanics and feedback control. Problems are raised and the proper tools established to find engineering oriented solutions rather than to focus on abstruse theoretical methodology. To impart practical skill, more than 60 examples and case studies are carefully worked out and interwoven through the text, with frequent resort to simulation. In addition, nearly 150 end-of-chapter problems are proposed, and the book is accompanied by a solutions manual (available at www.springer.com/978-1-84628-641-4) containing the MATLAB code for computer problems; this is available free of charge to those adopting Robotics as a textbook for courses.

This text is suitable for graduate and senior undergraduate students studying robotics, automation and computer, electrical, electronic and mechanical engineering courses with strong robotics content; academics researching and teaching robotics; and industry-based engineers dealing with all forms of robot.

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Trajectory Planning for Automatic Machines and Robots

Luigi Biagiotti and Claudio Melchiorri, Springer-Verlag, 2008. ISBN: 978-3-540-85628-3

This book deals with the problems related to planning motion laws and trajectories for the actuation system of automatic machines, in particular, for those based on electric drives and robots. The problem of planning suitable trajectories is relevant not only for the proper use of these machines, to avoid undesired effects such as vibrations or even damages on the mechanical structure, but also in some phases of their design and in the choice and sizing of the actuators. This is particularly true now that the concept of electronic cams has replaced, in the design of automatic machines, the classical approach based on mechanical cams.

The choice of a particular trajectory has direct and relevant implications on several aspects of the design and use of an automatic machine, such as the dimensioning of the actuators and reduction gears, the vibrations and efforts generated on the machine and on the load, the tracking errors during the motion execution.

For these reasons, to understand and appreciate the peculiarities of the different techniques available for trajectory planning, besides the mathematical aspects of their implementation and a detailed analysis in the time and frequency domains, a comparison of their main properties under different points of view, and general considerations related to their practical use are reported.

The contents of this book are suitable for the engineers and technicians in the fields of automatic machines and robotics, developers of applications for multiaxes machines and robot cells, and students of electrical and mechanical engineering courses.

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