

Book Reviews

Introduction to the Mechanics of Space Robots

G. Genta

Springer, Tiergartenstrasse 17, D-69121 Heidelberg, Germany. 2012. 597pp. £126. ISBN 978-94-007-1795-4.

In this book, Genta manages to address a number of topics close to his heart: from mechanical and automotive design, to control and dynamics, all presented in a space context. Written from a compilation of lecture notes, it provides the enthusiast, the student and the professional with a concise reference book addressing a wide range of topics, all focused on the design of space robots.

The author readily acknowledges that robotics and by extension space robotics is a complex and multi-disciplinary field calling upon a variety of skills and expertises. This book therefore does not try to address all of these in detail, but concentrates on providing a sound and thorough background on most of the key mechanical aspects, while briefly describing key concepts, such as control and autonomy, better presented elsewhere.

Starting with a presentation of a number of mission scenario and robotic systems, the author succinctly describes the various environments exploration robots will be operating in. In addition to understanding the critical design and operational challenges, this also provides a handy and useful compilation of the key environmental parameters of the planets, their moons as well as smaller bodies such as comets and asteroids.

The mechanical flavour of the book will then lead the reader through the design of a number of robotic systems, including manipulators, and a variety of planetary surface

mobility systems including wheeled and legged rovers. All of these chapters provide a broad and up-to-date range of conceptual options as well as useful implementation details including sensors and actuator subsystems.

While most of the content of these chapters will follow standard textbook material for terrestrial applications, Genta provides a number of useful examples to highlight where some of the assumptions used in deriving terrestrial systems need to be revisited for space applications. This is especially emphasised in the latter chapter that will discuss some of the key issues related to the design of the power system for space robotic applications.

Overall, this book manages to balance both breadth and depth and delivers a useful and concise reference to address some of the key aspects of the mechanical design of space robots, initially precursors, and then collaborators, to human exploration missions.

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Optimal Control – Third edition

F. L. Lewis et al

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK. 2012. 540pp. £100. ISBN 978-0-470-63349-6.

Optimal Control is an advanced text aimed at postgraduate level students. A thorough background in the state variable representation of systems is assumed