

DIRECT-DRIVE ROBOTS

THEORY AND PRACTICE

HARUHIKO ASADA AND KAMAL YUCEF-TOUMI

THE MIT PRESS CLASSICS

Direct Drive Robots Theory And Practice

Minjie Lin



Direct Drive Robots Theory And Practice:

Direct-drive Robots Haruhiko Asada, Kamal Youcef-Toumi, 1987-01 This book describes the design concept and discusses the control issues related to the performance of a direct drive robot specifically a direct drive mechanical arm capable of carrying up to 10 kilograms at 10 meters per second accelerating at 5 G a unit of acceleration equal to the acceleration of gravity These are remarkable achievements compared to current industrial robots that move with speeds on the order of 1 meter per second Direct Drive Robot presents the most current research in manipulator design and control emphasizing the high performance direct drive robot arm in which the shafts of articulated joints are directly coupled to the rotors of motors with high torque It describes fundamental technologies of key components such as motors amplifiers and sensors arm linkage design and control system design and makes significant contributions in the areas of power efficiency analysis dynamic mass balancing and decoupling theory The book provides a good balance between theory and practice covering the practical design and implementation of this special robot as well as the theoretical design tools Contents Part I Direct Drive Technologies Introduction Components Part II Arm Design Theory Power Efficiency Arm Design for Simplified Dynamics Actuator Relocation Design of Decoupled Arm Structures Part III Development of the MIT Arm Mechanisms Control Systems Part IV Selected Papers on Direct Drive Robot Design and Control Haruhiko Asada is an Associate Professor Kyoto University and Lecturer at MIT He has built two prototypes of the direct drive arm described here Kamal Youcef Toumi is an Assistant Professor Department of Mechanical Engineering System Dynamics and Controls Division at MIT He has worked for three years with Asada on the development of the MIT high speed directdrive robot *DIRECT DRIVE ROBOTS* Haruhiko Asada,

Robotics and Automation Handbook Thomas R. Kurfess, 2018-10-03 As the capability and utility of robots has increased dramatically with new technology robotic systems can perform tasks that are physically dangerous for humans repetitive in nature or require increased accuracy precision and sterile conditions to radically minimize human error The Robotics and Automation Handbook addresses the major aspects of designing fabricating and enabling robotic systems and their various applications It presents kinetic and dynamic methods for analyzing robotic systems considering factors such as force and torque From these analyses the book develops several controls approaches including servo actuation hybrid control and trajectory planning Design aspects include determining specifications for a robot determining its configuration and utilizing sensors and actuators The featured applications focus on how the specific difficulties are overcome in the development of the robotic system With the ability to increase human safety and precision in applications ranging from handling hazardous materials and exploring extreme environments to manufacturing and medicine the uses for robots are growing steadily The Robotics and Automation Handbook provides a solid foundation for engineers and scientists interested in designing fabricating or utilizing robotic systems *Robot Control 1991 (SYROCO'91)* I. Troch, 2014-05-23 This volume contains 92 papers on the state of the art in robotics research In this volume topics on modelling and identification are treated first as

they build the basis for practically all control aspects. Then the most basic control tasks are discussed, i.e. problems of inverse kinematics. Groups of papers follow which deal with various advanced control aspects. They range from rather general methods to more specialized topics such as force control and control of hydraulic robots. The problem of path planning is addressed and strategies for robots with one arm for mobile robots and for multiple arm robots are presented. Also covered are computational improvements and software tools for simulation and control, the integration of sensors and sensor signals in robot control.

Legged Robots that Balance Marc H. Raibert, 1986. This book by a leading authority on legged locomotion presents exciting engineering and science along with fascinating implications for theories of human motor control. It lays fundamental groundwork in legged locomotion, one of the least developed areas of robotics, addressing the possibility of building useful legged robots that run and balance. The book describes the study of physical machines that run and balance on just one leg, including analysis, computer simulation, and laboratory experiments. Contrary to expectations, it reveals that control of such machines is not particularly difficult. It describes how the principles of locomotion discovered with one leg can be extended to systems with several legs and reports preliminary experiments with a quadruped machine that runs using these principles. Raibert's work is unique in its emphasis on dynamics and active balance aspects of the problem that have played a minor role in most previous work. His studies focus on the central issues of balance and dynamic control while avoiding several problems that have dominated previous research on legged machines. Marc Raibert is Associate Professor of Computer Science and Robotics at Carnegie Mellon University and on the editorial board of The MIT Press journal *Robotics Research*. *Legged Robots That Balance* is fifteenth in the Artificial Intelligence Series edited by Patrick Winston and Michael Brady.

Proceedings of the 2018 International Symposium on Experimental Robotics Jing Xiao, Torsten Kröger, Oussama Khatib, 2020-01-22. In addition to the contributions presented at the 2018 International Symposium on Experimental Robotics ISER 2018, this book features summaries of the discussions that were held during the event in Buenos Aires, Argentina. These summaries, authored by leading researchers and session organizers, offer important insights on the issues that drove the symposium debates. Readers will find cutting-edge experimental research results from a range of robotics domains such as medical robotics, unmanned aerial vehicles, mobile robot navigation, mapping and localization, field robotics, robot learning, robotic manipulation, human-robot interaction, and design and prototyping. In this unique collection of the latest experimental robotics work, the common thread is the experimental testing and validation of new ideas and methodologies. The International Symposium on Experimental Robotics is a series of bi-annual symposia sponsored by the International Foundation of Robotics Research, whose goal is to provide a dedicated forum for experimental robotics research. In recent years, robotics has broadened its scientific scope, deepened its methodologies, and expanded its applications. However, the significance of experiments remains at the heart of the discipline. The ISER gatherings are an essential venue where scientists can meet and have in-depth discussions on robotics based on this central tenet.

Telemanipulator Technology

Hari Das,1993 **Applied Mechanics Reviews** ,1988 IROS ,1999 **Design of a Robotic Dexterous Manipulation Testbed** Curt Daniel Szymanski,1998 **Robotics Science** Michael Brady,1989 These 16 contributions provide a field guide to robotics science today These 16 contributions provide a field guide to robotics science today Each takes up current work the problems addressed and future directions in the areas of perception planning control design and actuation In a substantial introduction Michael Brady summarizes a personal list of 30 problems problem areas and issues that lie on the path to development of a science of robotics These involve sensing vision mobility design control manipulation reasoning geometric reasoning and systems integration ContentsThe Problems of Robotics Michael Brady Perception A Few Steps Toward Artificial 3 D Vision Olivier D Faugeras Contact Sensing for Robot Active Touch Paolo Dario Learning and Recognition in Natural Environments Alex Pentland and Robert Bolles 3 D Vision for Outdoor Navigation by an Autonomous Vehicle Martial Hebert and Takeo Kanade Planning Geometric Issues in Planning Robot Tasks Tomas Lozano Perez and Russell Taylor Robotic Manipulation Mechanics and Planning Matthew Mason Control A Survey of Manipulation and Assembly Development of the Field and Open Research Issues Daniel Whitney Control Suguru Arimoto Kinematics and Dynamics for Control John Hollerbach The Whole Iguana Rodney Brooks Design and Actuation Design and Kinematics for Force and Velocity Control of Manipulators and End Effectors Bernard Roth Arm Design Haruhiko Asada Behavior Based Design of Robot Effectors Stephen Jacobsen Craig Smith Klaus Biggers and Edwin Iversen Using an Articulated Hand to Manipulate Objects Kenneth Salisbury David Brock and Patrick O Donnell Legged Robots Marc RaibertRobotics Science is included in the System Development Foundation Benchmark series System Development Foundation grants have contributed significantly to the development of robotics in the United States during the 1980s **TENCON 2004** ,2004

Telemanipulator and Telepresence Technologies ,1994 **Proceedings of the 26th IEEE Conference on Decision and Control** ,1987 Robotics, Spatial Mechanisms, and Mechanical Systems Gary L. Kinzel,1992
Proceedings ,1992 Robomatix Reporter ,1986 **Recent Development in Stability, Vibration, and Control of Structural Systems** American Society of Mechanical Engineers. Applied Mechanics Division,1993 Proceedings of the First Asian Control Conference, Tokyo Metropolitan Institute of Technology, Tokyo, July 27-30, 1994 ,1994 **Modeling and Control of Robotic Manipulators and Manufacturing Processes** American Society of Mechanical Engineers. Winter Annual Meeting,1987

Adopting the Tune of Appearance: An Mental Symphony within **Direct Drive Robots Theory And Practice**

In some sort of taken by monitors and the ceaseless chatter of immediate interaction, the melodic splendor and psychological symphony produced by the prepared word often fade in to the back ground, eclipsed by the relentless noise and disturbances that permeate our lives. Nevertheless, nestled within the pages of **Direct Drive Robots Theory And Practice** a marvelous fictional value brimming with raw feelings, lies an immersive symphony waiting to be embraced. Crafted by an elegant composer of language, that captivating masterpiece conducts visitors on a psychological journey, well unraveling the concealed melodies and profound affect resonating within each carefully crafted phrase. Within the depths of this emotional review, we shall explore the book is key harmonies, analyze their enthralling writing style, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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