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Modelling and Identification in Robotics - Krzysztof R. Kozlowski 2012-12-06
As the use and relevance of robotics for countless scientific purposes grows all the time, research into the many diverse elements of the subject becomes ever more important and in demand. This volume examines in depth the most topical, complex issues of modelling and identification in robotics. The book is divided into three main parts. The !first part is devoted to robot dynamics modelling and identification of robot and load parameters, incorporating friction torques, discussing identification schemes, and presenting simulations and experiment al results of robot and load dynamic parameters identification. A general concept of robot programming language for research and educational purposes is examined and there is a detailed outline of its basic structures along with hardware requirements, which both constitute an open robot controller architecture. Finally a hybrid controller is derived, and several experimental results of this system are outlined. This impressive discussion of the topic covers both the theoretical and practical, illustrated throughout by examples and experimental results, and will be of value to anyone researching or practising within the field of robotics, automation and system i dentification or to control engineers.
Robot Control - Mark W. Spong 1993

Robot Manipulator Control - Frank L. Lewis 2003-12-12
Robot Manipulator Control offers a complete survey of control systems for serial-link robot arms and acknowledges how robotic device performance hinges upon a well-developed control system. Containing over 750 essential equations, this thoroughly up-to-date Second Edition, the book explicates theoretical and mathematical requisites for controls design and summarizes current techniques in computer simulation and implementation of controllers. It also addresses procedures and issues in computed-torque, robust, adaptive, neural network, and force control. New chapters relay practical information on commercial robot manipulators and devices and cutting-edge methods in neural network control.
Control of Robot Manipulators in Joint Space - Rafael Kelly 2006-03-30
Tutors can design entry-level courses in robotics with a strong orientation to the fundamental discipline of manipulator control pdf solutions manual Overheads will save a great deal of time with class preparation and will give students a low-effort basis for more detailed class notes Courses for senior undergraduates can be designed around Parts I – III; these can be augmented for masters courses using Part IV
Springer Handbook of Robotics - Bruno Siciliano 2016-07-27
The second edition of this handbook provides a state-of-the-art overview on the various aspects in the rapidly developing field of robotics. Reaching for the human frontier, robotics is vigorously engaged in the growing challenges of new emerging domains. Interacting, exploring, and working with humans, the new generation of robots will increasingly touch people and their lives. The credible prospect of practical robots among humans is the result of the scientific endeavour of a half a century of robotic developments that established robotics as a modern scientific discipline. The ongoing vibrant expansion and strong growth of the field during the last decade has fueled this second edition of the Springer Handbook of Robotics. The first edition of the handbook soon became a landmark in robotics publishing and won the American Association of Publishers PROSE Award for Excellence in Physical Sciences & Mathematics as well as the organization’s Award for Engineering & Technology. The second edition of the handbook, edited by two internationally renowned scientists with the support of an outstanding team of seven part editors and more than 200 authors, continues to be an authoritative reference for robotics researchers, newcomers to the field, and scholars from related disciplines. The contents have been restructured to achieve four main objectives: the enlargement of foundational topics for robotics, the enlightenment of design of various types of robotic systems, the extension of the treatment on robots moving in the environment, and the enrichment of advanced robotics applications. Further to an extensive update, fifteen new chapters have been introduced on emerging topics, and a new generation of authors have joined the handbook’s team. A novel addition to the second edition is a comprehensive collection of multimedia references to more than 700 videos, which bring valuable insight into the contents. The videos can be viewed directly augmented into the text with a smartphone or tablet using a unique and specially designed app. Springer Handbook of Robotics Multimedia Extension Portal: http://handbookofrobotics.org/
Dynamic Decoupling of Robot Manipulators - Vigen Arakelian 2018-02-20
This book presents the latest results in the field of dynamic decoupling of robot manipulators obtained in France, Russia, China and Austria. Manipulator dynamics can be highly coupled and nonlinear. The complicated dynamics result from varying inertia, interactions between the different joints, and nonlinear forces such as Coriolis and centrifugal forces. The dynamic decoupling of robot manipulators allows one to obtain a linear system, i.e. single-input and single output system with constant parameters. This simplifies the optimal control and accumulation of energy in manipulators. There are two ways to create the dynamically decoupled manipulators: via optimal mechanical design or control. This work emphasises mechatronic solutions. These will certainly improve the known design concepts permitting the dynamic decoupling of serial manipulators with a relatively small increase in total mass of the moving links taking into account the changing payload. For the first time such an approach has been applied on serial manipulators. Also of great interest is the dynamic decoupling control of parallel manipulators. Firstly, the dynamic model of redundant multi-axial vibration table with load has been established, and, secondly, its dynamic coupling characteristics have been analyzed. The discussed methods and applications of dynamic decoupling of robot manipulators are illustrated via CAD simulations and experimental tests.
Intelligent Control - Nazmul Siddique 2013-11-29
Intelligent Control considers non-traditional modelling and control approaches to nonlinear systems. Fuzzy logic, neural networks and evolutionary computing techniques are the main tools used. The book presents a modular switching fuzzy logic controller where a PD-type fuzzy controller is executed first followed by a PI-type fuzzy controller thus improving the performance of the controller compared with a PID-type fuzzy controller. The advantage of the switching-type fuzzy controller is that it uses one rule-base thus minimises the rule-base during execution. A single rule-base is developed by merging the membership functions for change of error of the PD-type controller and sum of error of the PI-type controller. Membership functions are then optimized using evolutionary algorithms. Since the two fuzzy controllers were executed in series, necessary further tuning of the differential and integral scaling factors of the controller is then performed. Neural-network-based tuning for the scaling parameters of the fuzzy controller is then described and finally an evolutionary algorithm is applied to the neurally-tuned-fuzzy controller in which the sigmoidal function shape of the neural network is determined. The important issue of stability is addressed and the text demonstrates empirically that the developed controller was stable within the operating range. The text concludes with ideas for future research to show the reader the potential for further study in this area.

Intelligent Control will be of interest to researchers from engineering and computer science backgrounds working in the intelligent and adaptive control.

Modelling and Simulation of Robot Manipulators - Albert Y Zomaya 1993-01-29

This book aims to describe how parallel computer architectures can be used to enhance the performance of robots, and their great impact on future generations of robots. It provides an in-depth, consistent and rigorous treatment of the topic. A clear definition of tools with results is given which can be applied to parallel processing for robot kinematics and dynamics. Another advantageous feature is that the algorithms presented have been implemented using a parallel processing system, unlike many publications in the field which have presented results in only theoretical terms. This book also includes “benchmark” results that can be used for the development of future work, or can serve as a basis for comparison with other work. In addition, it surveys useful material to aid readers in pursuing further research. Contents:IntroductionThe Parallel Processing ApproachRobot KinematicsComputing the JacobianInverse Jacobian ComputationRobot DynamicsParallel Computations of Robot DynamicsTuning of Robot DynamicsConcluding RemarksAppendix AAppendix BAppendix CAppendix D Readership: Engineers and computer scientists.

Fundamentals of Robotics - Robert Joseph Schilling 1990

A complete overview of the fundamentals of robotics. Case study examples of educational, industrial and generic robots are discussed. Class demonstration software is provided with the laboratory manual. (vs. Craig, Fu, and Asada).

A Mathematical Introduction to Robotic Manipulation - Richard M. Murray 2017-12-14

A Mathematical Introduction to Robotic Manipulation presents a mathematical formulation of the kinematics, dynamics, and control of robot manipulators. It uses an elegant set of mathematical tools that emphasizes the geometry of robot motion and allows a large class of robotic manipulation problems to be analyzed within a unified framework. The foundation of the book is a derivation of robot kinematics using the product of the exponentials formula. The authors explore the kinematics of open-chain manipulators and multifingered robot hands, present an analysis of the dynamics and control of robot systems, discuss the specification and control of internal forces and internal motions, and address the implications of the nonholonomic nature of rolling contact are addressed, as well. The wealth of information, numerous examples, and exercises make A Mathematical Introduction to Robotic Manipulation valuable as both a reference for robotics researchers and a text for students in advanced robotics courses.

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.

Introduction to Robotics - Saeed B. Niku 2010-09-22

Niku offers comprehensive, yet concise coverage of robotics that will appeal to engineers. Robotic applications are drawn from a wide variety of fields. Emphasis is placed on design along with analysis and modeling. Kinematics and dynamics are covered extensively in an accessible style. Vision systems are discussed in detail, which is a cutting-edge area in robotics. Engineers will also find a running design project that reinforces the concepts by having them apply what they’ve learned.

Robot Control 1988 (SYROCO'88) - U. Rembold 2014-05-23

Containing 88 papers, the emphasis of this volume is on the control of advanced robots. These robots may be self-contained or part of a system. The applications of such robots vary from manufacturing, assembly and material handling to space work and rescue operations. Topics presented at the Symposium included sensors and robot vision systems as well as the planning and control of robot actions. Main topics covered include the design of control systems and their implementation; advanced sensors and multisensor systems; explicit robot programming; implicit (task-orientated) robot programming; interaction between programming and control systems; simulation as a programming aid; AI techniques for advanced robot systems and autonomous robots.

Robotics - Nicholas Roy 2013-07-05

Papers from a flagship conference reflect the latest developments in the field, including work in such rapidly advancing areas as human-robot interaction and formal methods. Robotics: Science and Systems VIII spans a wide spectrum of robotics, bringing together contributions from researchers working on the mathematical foundations of robotics, robotics applications, and analysis of robotics systems. This volume presents the proceedings of the eighth annual Robotics: Science and Systems (RSS) conference, held in July 2012 at the University of Sydney. The contributions reflect the exciting diversity of the field, presenting the best, the newest, and the most challenging work on such topics as mechanisms, kinematics, dynamics and control, human-robot interaction and human-centered systems, distributed systems, mobile systems and mobility, manipulation, field robotics, medical robotics, biological robotics, robot perception, and estimation and learning in robotic systems. The conference and its proceedings reflect not only the tremendous growth of robotics as a discipline but also the desire in the robotics community for a flagship event at which the best of the research in the field can be presented.

Applied Control of Manipulation Robots - Miomir Vukobratovic 2012-12-06

The first book of the new, textbook series, entitled Applied Dynamics of Manipulation Robots: Modelling, Analysis and Examples, by M. Vukobratovic, published by Springer-Verlag (1989) was devoted to the problems of dynamic models and dynamic analysis of robots. The present book, the second in the series, is concerned with the problems of the robot control. In conceiving this textbook, several dillemas arouse. The main issue was the question on what should be incorporated in a textbook on such a complex subject. Namely, the robot control comprises a wide range of topics related to various aspects of robotics, starting from the syn thesis of the lowest, executive, control level, through the synthesis of trajectories (which is mainly related to kinematic models of robots) and various algorithms for solving the problem of task and robot moti on planning (including the solving of the problems by the methods of artificial intelligence) to the aspects of processing the data obtai ned from sensors. The robot control is closely related to the robot pro gramming (i. e. the development of highly-specialized programming lan guages for robot programming). Besides, numerous aspects of the con trol realization should be included here. It is obvious that all these aspects of control cannot be treated in detail in the frame of a text book.

Machines, Mechanism and Robotics - Rajeev Kumar 2021-07-21

This volume includes select papers presented during the 4th International and 19th National Conference on Machines and Mechanism (iNaCoMM 2019), held in Indian Institute of Technology, Mandi. It presents research on various aspects of design and analysis of machines and mechanisms by academic and industry researchers.

Computer-Aided Design, Engineering, and Manufacturing - Cornelius T. Leondes 2000-12-12

In the competitive business arena companies must continually strive to create new and better products faster, more efficiently, and more cost effectively than their competitors to gain and keep the competitive advantage. Computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) are now the industry standard. These seven volumes give the reader a comprehensive treatment of the techniques and applications of CAD, CAE, and CAM.

Space Robotics: Dynamics and Control - Yangsheng Xu 2012-12-06

Robotic technology offers two potential benefits for future space exploration. One benefit is minimizing the risk that astronauts face. The other benefit is increasing their productivity. Realizing the benefits of robotic technology in space will require solving several problems which are unique and now becoming active research topics. One of the most important research areas is dynamics, control, motion and planning for space robots by considering the dynamic interaction between the robot and the base (space station, space shuttle, or satellite). Any inefficiency in the planning and control can considerably risk by success of the space mission. Space Robotics: Dynamics and Control presents a collection of papers concerning fundamental problems in dynamics and control of space robots, focussing on issues relevant to dynamic base/robot interaction. The authors are all pioneers in theoretical analysis and experimental systems development of space robot technology. The chapters are organized within three problem areas: dynamics

problems, nonholonomic nature problems, and control problems. This collection provides a solid reference for researchers in robotics, mechanics, control, and astronautical science.

Control Theory of Robotic Systems - J M Skowronski 1989-08-01

Automated manufacturing is the topic of the day in industry and thus also in R&D investigation in both industrial laboratories and academia. The core of such studies lies in systems of robotic manipulators, with control of such systems for stability, effective goal reaching and coordination (timing, avoidance of collision) being an essential part of it. The manipulators must work at high speed and under considerable payloads which require nonlinear modelling. Their work is subject to bounded uncertainty in many parameters but precision must be secured. This book gives the theoretic base and specific algorithms for control, attaining the objectives under the above features. The algorithms given are in closed form, which makes for fast on-board computing. The book deals with its subject of systems of robots and their coordination control on a fundamental basis, using realistic untruncated models. It will be of lasting interest compared to texts dealing with details of the design of the day. Contents:Systems of Robot ArmsState Space and EnergyNavigation and Object HandlingTracking and AvoidanceTwo Arm Systems and Multi-Arm Coordination Game Readership: Computer scientists, electrical and mechanical engineers.

Introduction to Mobile Robot Control - Spyros G Tzafestas 2013-10-03

Introduction to Mobile Robot Control provides a complete and concise study of modeling, control, and navigation methods for wheeled non-holonomic and omnidirectional mobile robots and manipulators. The book begins with a study of mobile robot drives and corresponding kinematic and dynamic models, and discusses the sensors used in mobile robotics. It then examines a variety of model-based, model-free, and vision-based controllers with unified proof of their stabilization and tracking performance, also addressing the problems of path, motion, and task planning, along with localization and mapping topics. The book provides a host of experimental results, a conceptual overview of systemic and software mobile robot control architectures, and a tour of the use of wheeled mobile robots and manipulators in industry and society. Introduction to Mobile Robot Control is an essential reference, and is also a textbook suitable as a supplement for many university robotics courses. It is accessible to all and can be used as a reference for professionals and researchers in the mobile robotics field. Clearly and authoritatively presents mobile robot concepts Richly illustrated throughout with figures and examples Key concepts demonstrated with a host of experimental and simulation examples No prior knowledge of the subject is required; each chapter commences with an introduction and background

Modeling, Identification and Control of Robots - W. Khalil 2004-07-01

Written by two of Europe’s leading robotics experts, this book provides the tools for a unified approach to the modelling of robotic manipulators, whatever their mechanical structure. No other publication covers the three fundamental issues of robotics: modelling, identification and control. It covers the development of various mathematical models required for the control and simulation of robots. · World class authority · Unique range of coverage not available in any other book · Provides a complete course on robotic control at an undergraduate and graduate level

Modelling and Control of Robot Manipulators - Lorenzo Sciavicco 2012-12-06

Fundamental and technological topics are blended uniquely and developed clearly in nine chapters with a gradually increasing level of complexity. A wide variety of relevant problems is raised throughout, and the proper tools to find engineering-oriented solutions are introduced and explained, step by step. Fundamental coverage includes: Kinematics; Statics and dynamics of manipulators; Trajectory planning and motion control in free space. Technological aspects include: Actuators; Sensors; Hardware/software control architectures; Industrial robot-control algorithms. Furthermore, established research results involving description of end-effector orientation, closed kinematic chains, kinematic redundancy and singularities, dynamic parameter identification, robust and adaptive control and force/motion control are provided. To provide readers with a homogeneous background, three appendices are included on: Linear algebra; Rigid-body mechanics; Feedback control. To acquire practical skill, more than 50 examples and case studies are carefully worked out and interwoven through the text, with frequent resort to simulation. In addition, more than 80 end-of-chapter exercises are proposed, and the book is accompanied by a solutions manual containing the MATLAB code for computer problems; this is available from the publisher free of charge to those adopting this work as a textbook for courses.

Handbook of Industrial Robotics - Shimon Y. Nof 1999-03-02

About the Handbook of Industrial Robotics, Second Edition: "Once again, the Handbook of Industrial Robotics, in its Second Edition, explains the good ideas and knowledge that are needed for solutions." - Christopher B. Galvin, Chief Executive Officer, Motorola, Inc. "The material covered in this Handbook reflects the new generation of robotics developments. It is a powerful educational resource for students, engineers, and managers, written by a leading team of robotics experts." - Yukio Hasegawa, Professor Emeritus, Waseda University, Japan. "The Second Edition of the Handbook of Industrial Robotics organizes and systematizes the current expertise of industrial robotics and its forthcoming capabilities. These efforts are critical to solve the underlying problems of industry. This continuation is a source of power. I believe this Handbook will stimulate those who are concerned with industrial robots, and motivate them to be great contributors to the progress of industrial robotics." -Hiroshi Okuda, President, Toyota Motor Corporation. "This Handbook describes very well the available and emerging robotics capabilities. It is a most comprehensive guide, including valuable information for both the providers and consumers of creative robotics applications." -Donald A. Vincent, Executive Vice President, Robotic Industries Association 120 leading experts from twelve countries have participated in creating this Second Edition of the Handbook of Industrial Robotics. Of its 66 chapters, 33 are new, covering important new topics in the theory, design, control, and applications of robotics. Other key features include a larger glossary of robotics terminology with over 800 terms and a CD-ROM that vividly conveys the colorful motions and intelligence of robotics. With contributions from the most prominent names in robotics worldwide, the Handbook remains the essential resource on all aspects of this complex subject.

Manipulation RobotsDynamics, Control, and Optimization - Felix L. Chernousko 1993-11-24

Addresses challenging aspects of robotics research, including the dynamics of robots with elastic parts and optimal control of manipulators. Basics in kinematics, dynamics, drives, and control and sensor systems are discussed. To more efficiently evaluate the elastic compliance of robots and their dynamic accuracy, the authors propose new computer techniques and provide much experimental data. Optimal control methods presented in the book allow robotics engineers to increase the speed and productivity of robotic operations and reduce energy consumption. New developments in robotics covered include pneumatic sensors, adaptive grippers, special robotic systems for measurement and inspection, and wall-climbing robots with technological manipulators. The book will be an important reference for mechanical engineers, electrical engineers, robotics engineers, and researchers in automatic control.

Robotics Science - Michael Brady 1989

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. Contents: The 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 Raibert. Michael Brady is Professor of Information Engineering at Oxford University. Robotics 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.

Robot Analysis and Control - H. Asada 1991-01-16
Introduces the basic concepts of robot manipulation--the fundamental kinematic and dynamic analysis of manipulator arms, and the key techniques for trajectory control and compliant motion control. Material is supported with abundant examples adapted from successful industrial practice or advanced research topics. Includes carefully devised conceptual diagrams, discussion of current research topics with references to the latest publications, and end-of-book problem sets. Appendixes. Bibliography.
Telerobotics, Automation, and Human Supervisory Control - Thomas B. Sheridan 1992
For the past three decades, the author and his colleagues in the MIT Man-Machine Systems Laboratory have been carrying out experimental research in the area of teleoperation, telerobotics, and supervisory control - a new form of technology that allows humans to work through machines in hazardous environments and control complex systems such as aircraft and nuclear power plants. This timely reference brings together a variety of theories and technologies that have emerged in a number of fields of application, describing common themes, presenting experiments and hardware embodiments as examples, and discussing the advantages and the drawbacks of this new form of human-machine interaction. There are many places - such as outer space, the oceans, and nuclear, biologically, and chemically toxic environments - that are inaccessible or hazardous to humans but in which work needs to be done. Telerobotics - remote supervision by human operators of robotic or semiautomatic devices - is a way to enter these difficult environments. Yet it raises a host of problems, such as the retrieval of sensory information for the human operator, and how to control the remote devices with sufficient dexterity. In its complete coverage of the theoretical and technological aspects of telerobotics and human-computer cooperation in the control of complex systems, this book moves beyond the simplistic notion of humans versus automation to provide the necessary background for exploring a new and informed cooperative relationship between humans and machines. Thomas B. Sheridan is Professor of Engineering and Applied Psychology at the Massachusetts Institute of Technology. Contents: Introduction. Theory and Models of Supervisory Control: Frameworks and Fragments. Supervisory Control of Anthropomorphic Teleoperators for Space, Undersea, and Other Applications. Supervisory Control in Transportation, Process, and Other Automated Systems. Social Implications of Telerobotics, Automation, and Supervisory Control.
SYROM 2009 - Ion Visa 2010-03-23
SYROM conferences have been organized since 1973 by the Romanian branch of the International Federation for the Promotion of Mechanisms and Machine Science IFToMM, Year by year the event grew in quality. Now in its 10th edition, international visibility and recognition among the researchers active in the mechanisms science field has been achieved. SYROM 2009 brought together researchers and academic staff from the field of mechanisms and machine science from all over the world and served as a forum for presenting the achievements and most recent results in research and education. Topics treated include conceptual design, kinematics and dynamics, modeling and simulation, synthesis and optimization, command and control, current trends in education in this field, applications in high-tech products. The papers presented at this conference were subjected to a peer-review process to ensure the quality of the paper, the engineering significance, the soundness of results and the originality of the paper. The accepted papers fulfill these criteria and make the proceedings unique among the publications of this type.
Robot Analysis - Lung-Wen Tsai 1999-02-22
Complete, state-of-the-art coverage of robot analysis This unique book provides the fundamental knowledge needed for understanding the mechanics of both serial and parallel manipulators. Presenting fresh and authoritative material on parallel manipulators that is not available in any other resource, it offers an in-depth treatment of position analysis, Jacobian analysis, statics and stiffness analysis, and dynamical analysis of both types of manipulators, including a discussion of industrial and research applications. It also features: * The homotopy continuation method and dialytic elimination method for solving polynomial systems that apply to robot kinematics * Numerous worked examples and problems to reinforce learning * An extensive bibliography offering many resources for more advanced study Drawing on Dr. Lung-Wen Tsai's vast experience in the field as well as recent research publications, Robot Analysis is a first-rate text for upper-level undergraduate and graduate students in mechanical engineering, electrical engineering, and computer studies, as well as an excellent desktop reference for robotics researchers working in industry or in government.
Nonlinear Control of Vehicles and Robots - Béla Lantos 2010-12-01
Nonlinear Control of Vehicles and Robots develops a unified approach to the dynamic modeling of robots in terrestrial, aerial and marine environments. The main classes of nonlinear systems and stability methods are summarized and basic nonlinear control methods, useful in manipulator and vehicle control, are presented. Formation control of ground robots and ships is discussed. The book also deals with the modeling and control of robotic systems in the presence of non-smooth nonlinearities. Robust adaptive tracking control of robotic systems with unknown payload and friction in the presence of uncertainties is treated. Theoretical and practical aspects of the control algorithms under discussion are detailed. Examples are included throughout the book allowing the reader to apply the control and modeling techniques in their own research and development work. Some of these examples demonstrate state estimation based on the use of advanced sensors as part of the control system.
A Journey from Robot to Digital Human - Edward Y L Gu 2013-07-24
This book provides readers with a solid set of diversified and essential tools for the theoretical modeling and control of complex robotic systems, as well as for digital human modeling and realistic motion generation. Following a comprehensive introduction to the fundamentals of robotic kinematics, dynamics and control systems design, the author extends robotic modeling procedures and motion algorithms to a much higher-dimensional, larger scale and more sophisticated research area, namely digital human modeling. Most of the methods are illustrated by MATLABTM codes and sample graphical visualizations, offering a unique closed loop between conceptual understanding and visualization. Readers are guided through practicing and creating 3D graphics for robot arms as well as digital human models in MATLABTM, and through driving them for real-time animation. This work is intended to serve as a robotics textbook with an extension to digital human modeling for senior undergraduate and graduate engineering students. At the same time, it represents a comprehensive reference guide for all researchers, scientists and professionals eager to learn the fundamentals of robotic systems as well as the basic methods of digital human modeling and motion generation.
Theory of Applied Robotics - Reza N. Jazar 2010-05-30
This user-friendly book presents a wealth of robotics topics at a theoretical-practical level, most notably orientation, velocity, and forward kinematics. It explains robotics concepts in detail, concentrating on their practical use. More than 300 detailed examples with fully-worked solutions help provide a balanced and broad understanding of robotics in today’s world. In addition, the book includes related theorems and formal proofs as well as real-life applications. The volume is richly illustrated with over 200 diagrams to help readers visualize concepts. It also offers a wealth of detailed problem sets and challenge problems for the more advanced reader.
RoManSy 6 - A. Morecki 2012-12-06

Robotics - Bruno Siciliano 2010-08-20
Based on the successful Modelling and Control of Robot Manipulators by Sciavicco and Siciliano (Springer, 2000), Robotics provides the basic know-how on the foundations of robotics: modelling, planning and control. It has been expanded to include coverage of mobile robots, visual control and motion planning. A variety of problems is raised throughout, and the proper tools to find engineering-oriented solutions are introduced and explained. The text includes coverage of fundamental topics like kinematics, and trajectory planning and related technological aspects including actuators and sensors. To impart practical skill, examples and case studies are carefully worked out and interwoven through the text, with frequent resort to simulation. In addition, end-of-chapter exercises are proposed, and the book is accompanied by an electronic solutions manual containing the MATLAB® code for computer problems; this is available free of charge to those adopting this volume as a textbook for courses.
Modeling Identification and Control of Robots - Wisama Khalil 2002

Modern Robotics - Kevin M. Lynch 2017-05-25
This introduction to robotics offers a distinct and unified perspective of the mechanics, planning and

control of robots. Ideal for self-learning, or for courses, as it assumes only freshman-level physics, ordinary differential equations, linear algebra and a little bit of computing background. Modern Robotics presents the state-of-the-art, screw-theoretic techniques capturing the most salient physical features of a robot in an intuitive geometrical way. With numerous exercises at the end of each chapter, accompanying software written to reinforce the concepts in the book and video lectures aimed at changing the classroom experience, this is the go-to textbook for learning about this fascinating subject.

Motion Control Systems - Asif Sabanovic 2011-03-10

Motion Control Systems is concerned with design methods that support the never-ending requirements for faster and more accurate control of mechanical motion. The book presents material that is fundamental, yet at the same time discusses the solution of complex problems in motion control systems. Methods presented in the book are based on the authors' original research results. Mathematical complexities are kept to a required minimum so that practicing engineers as well as students with a limited background in control may use the book. It is unique in presenting know-how accumulated through work on very diverse problems into a comprehensive unified approach suitable for application in high demanding, high-tech products. Major issues covered include motion control ranging from simple trajectory tracking and force control, to topics related to haptics, bilateral control with and without delay in measurement and control channels, as well as control of nonredundant and redundant multibody systems. Provides a consistent unified theoretical framework for motion control design Offers graduated increase in complexity and reinforcement throughout the book Gives detailed explanation of underlying similarities and specifics in motion control Unified treatment of single degree-of-freedom and multibody systems Explains the fundamentals through implementation examples Based on classroom-tested materials and the authors' original research work Written by the leading researchers in sliding mode control (SMC) and disturbance observer (DOB) Accompanying lecture notes for instructors Simulink and MATLAB® codes available for readers to download Motion Control Systemsis an ideal textbook for a course on motion control or as a reference for post-graduates and researchers in robotics and mechatronics. Researchers and practicing engineers will also find the techniques helpful in designing mechanical motion systems.

Robotics and Rehabilitation Intelligence - Jianhua Qian 2020-12-18

This 2-volume set constitutes the refereed proceedings of 1st International Conference on Robotics and Rehabilitation Intelligence, ICRRI 2020, held in Fushun, China, in September 2020. The 56 full and 4 short papers were carefully reviewed and selected from 188 submissions. The papers are divided into the following topical sections. In the first volume: Rehabilitation robotics and safety; machine vision application; electric drive and power system fault diagnosis; robust stability and stabilization; intelligent method application; intelligent control and perception; smart remanufacturing and industrial intelligence; and intelligent control of integrated energy system. In the second volume: smart healthcare and intelligent information processing; human-robot interaction; multi-robot systems and control; robot design and control; robotic vision and machine intelligence; optimization method in monitoring; advanced process control in petrochemical process; and rehabilitation intelligence.

Flexible Joint Robots - Mark C. Readman 1994-07-13

Joint flexibility from harmonic or direct drives or flexible couplings limits the performance of robots. Performance can be improved by taking into account the fast dynamics that are introduced by joint flexibility. High gain acceleration feedback from the link angles simplifies the robot dynamics, but is limited by joint flexibility. One solution is to use joint torque feedback to stabilize the fast dynamics. In light of this, drive systems that incorporate joint torque sensors are being developed. Flexible Joint Robots is the first book to consider the myriad problems and potential solutions that affect flexible joint robot design. The book covers fundamental concepts, including joint torque feedback control laws, acceleration feedback, and adaptive control laws. It presents a dynamic model of a flexible joint robot in several coordinate systems and includes an analysis of the fast dynamics.

Computer Aided Design in Control Systems 1988 - Zhen-Yu Chen 2014-06-28

This volume contains 73 papers, presenting the state of the art in computer-aided design in control systems (CADCS). The latest information and exchange of ideas presented at the Symposium illustrates the development of computer-aided design science and technology within control systems. The Proceedings contain six plenary papers and six special invited papers, and the remainder are divided into five themes: CADCS packages; CADCS software and hardware; systems design methods; CADCS expert systems; CADCS applications, with finally a discussion on CADCS in education and research.