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The aim of the book is to introduce the state-of-the-art technologies in the field of robotics, mechatronics and automation in agriculture in order to summarize and review the improvements in the methodologies in agricultural robotics. Advances made in the past decades are described, including robotics for agriculture, mechatronics for agriculture, kinematics, dynamics and control analysis of agricultural robotics, and a wide range of topics in the field of robotics, mechatronics and automation for agricultural applications.

This book can serve as a reference resource for those very same design and control engineers who help connect their everyday experience in design with the control field of mechatronics. This book also consists of basic and main mechatronic system's laboratory applications for use in research and development departments in academia, government, and industry, and it can be used as a ref-

erence source in university libraries. It can also be used as a resource for scholars interested in understanding and explaining the engineering design and control process and for engineering students studying within the traditional structure of most engineering departments and colleges. It is evident that there is an expansion of mechatronics laboratories and classes in the university environment worldwide.

Mechatronics is a core subject for engineers, combining elements of mechanical and electronic engineering into the development of computer-controlled mechanical devices such as DVD players or anti-lock braking systems. This book is the most comprehensive text available for both mechanical and electrical engineering students and will enable them to engage fully with all stages of mechatronic system design. It offers broader and more integrated coverage than other books in the field with practical examples, case studies and exercises throughout and an Instructor's Manual. A

further key feature of the book is its integrated coverage of programming the PIC microcontroller, and the use of MATLAB and Simulink programming and modelling, along with code files for downloading from the accompanying website. * Integrated coverage of PIC microcontroller programming, MATLAB and Simulink modelling * Fully developed student exercises, detailed practical examples * Accompanying website with Instructor's Manual, downloadable code and image bank

While technologies continue to advance in different directions, there still holds a constant evolution of interdisciplinary development. Robotics and mechatronics is a successful fusion of disciplines into a unified framework that enhances the design of products and manufacturing processes. Engineering Creative Design in Robotics and Mechatronics captures the latest research developments in the subject field of robotics and mechatronics and provides relevant theoretical knowledge in this field. Providing interdisciplinary development approaches, this reference source prepares students, scientists, and professional engineers with the latest research development to enhance their skills of innovative design capabilities.

The first comprehensive reference on mechatronics, The Mechatronics Handbook was quickly embraced as the gold standard in the field. From washing machines, to coffeemakers, to cell phones, to the ubiquitous PC in almost every household, what, these days, doesn't take advantage of mechatronics in its design and function? In the scant five years since the initial publication of the handbook, the latest generation of smart products has made this even more obvious. Too much material to cover in a sin-

gle volume Originally a single-volume reference, the handbook has grown along with the field. The need for easy access to new material on rapid changes in technology, especially in computers and software, has made the single volume format unwieldy. The second edition is offered as two easily digestible books, making the material not only more accessible, but also more focused. Completely revised and updated, Robert Bishop's seminal work is still the most exhaustive, state-of-the-art treatment of the field available.

Mechatronics: Electronics in Products and Processes identifies the concepts which underpin the mechatronic approach to engineering design and brings together its principle components - sensors and transducers, embedded microprocessors, actuators and drives - to explore their interrelationships. The text focuses primarily on hardware elements and the impact of system architecture. Modern technology is set in an historical background and each chapter comes with learning objectives and chapter outlines. The book includes numerous case studies illustrating the concepts applied in such areas as automatic cameras, aerospace parts manufacturing, fly-by-wire systems, and boat autopilot.

This book, the first in the Woodhead Publishing Reviews: Mechanical Engineering Series, is a collection of high quality articles (full research articles, review articles and cases studies) with a special emphasis on research and development in mechatronics and manufacturing engineering. Mechatronics is the blending of mechanical, electronic, and computer engineering into an integrated design. Today, mechatronics has a significant and increasing impact on engineering with emphasis on the design, development and operation of manufacturing engineer-

ing systems. The main objective of this interdisciplinary engineering field is the study of automata from an engineering perspective, thinking on the design of products and manufacturing processes and systems. Mechatronics and manufacturing systems are well established and executed within a great number of industries including aircraft, automotive and aerospace industries; machine tools, moulds and dies product manufacturing, computers, electronics, semiconductor and communications, and biomedical. A collection of high quality articles with a special emphasis on research and development in mechatronics and manufacturing engineering Presents a range of views based on international expertise Written by a highly knowledgeable and well-respected expert in the field

An Up-To-Date Reference on the Latest Developments of Mechatronics Geared toward engineers, designers, researchers, educators, and students, Mechatronics: Fundamentals and Applications focuses on integrating practice with theory relevant to electromechanical and multidomain systems. A result of the Distinguished Visiting Fellowship of the Royal Acad

"The integration of electronic engineering, electrical engineering, computer technology and control engineering with mechanical engineering -- mechatronics -- now forms a crucial part in the design, manufacture and maintenance of a wide range of engineering products and processes. This book provides a clear and comprehensive introduction to the application of electronic control systems in mechanical and electrical engineering. It gives a framework of knowledge that allows engineers and technicians to develop an interdisciplinary understanding and integrated approach to engineering.

This second edition has been updated and expanded to provide greater depth of coverage." -- Back cover.

The book "Mechatronics: Recent Technological and Scientific Advances" provides comprehensive and accessible coverage of the evolving disciplines of mechatronics for nanotechnology, automatic control & robotics, biomedical engineering, design manufacturing and testing of MEMS, metrology, photonics, mechatronic products majors. It is already the third volume following the previous editions in 2007 and 2009 providing a recent state of advances in mechatronics presented on the 9th International Conference Mechatronics 2011, hosted this year at the Faculty of Mechatronics, Warsaw University of Technology, Poland. The carefully selected contributions give an insight into the current development of these scientific disciplines, present the new results of research and development and indicate the trends of development in the interdisciplinary field of mechatronics systems. Even though many people believe that the presence of mechanical, electrical, electronic components, and computers make a system mechatronics, others do not feel the same as there is nothing wrong with the individual identity. The enclosed material is original, and reflects the main research tendencies and developments in mechatronics among Mechatronics 2011 contributing countries. It helps to acquire the mix of skills needed to comprehend and design mechatronic systems and also provides with the frame of understanding to develop a truly interdisciplinary and integrated approach to engineering. The enclosed material is original, and reflects the main research tendencies and developments in mechatronics among Mechatronics 2011 contributing countries. It helps to acquire the mix of

skills needed to comprehend and design mechatronic systems and also provides with the frame of understanding to develop a truly interdisciplinary and integrated approach to engineering.

The book includes 61 selected papers from 106 presented at the second International Conference on Machine Automation (ICMA2000). The conference focused, for the first time, on human friendly mechatronics which covers machine systems interacting with human beings, psychological, physiological, and physical behaviors of the human being itself, robotics, human-mimetic mechanical systems, commercial application examples and so on. Machine automation has owed a lot to mechatronics technology in the last decades, however, a paradigm shift is desired and emphasized in the 21st century in every aspect of our society, and mechatronics is not an exception. The paradigm shift in mechatronics is a pursuit of productivity and efficiency to the preference of humans, and it is time that a new concept of a human friendly robot must be proposed that is welcome by human users. The book aims to offer the most up-to-date and valuable information on:

- Human Interface & Communication
- Human Support Technology
- Actuator & Control
- Vision & Sensing
- Robotics and Design
- Manufacturing System

We believe this book will bring advanced knowledge and valuable information to the industries as well as to academics and will contribute to the further development in mechatronics and its related fields.

For the first time in a single reference, this book provides the beginner with a coherent and logical introduction to the hardware and software of the PIC32, bringing together key material from the PIC32 Reference Manual, Data Sheets, XC32 C Compiler User's Guide, Assem-

bler and Linker Guide, MIPS32 CPU manuals, and Harmony documentation. This book also trains you to use the Microchip documentation, allowing better life-long learning of the PIC32. The philosophy is to get you started quickly, but to emphasize fundamentals and to eliminate "magic steps" that prevent a deep understanding of how the software you write connects to the hardware. Applications focus on mechatronics: microcontroller-controlled electromechanical systems incorporating sensors and actuators. To support a learn-by-doing approach, you can follow the examples throughout the book using the sample code and your PIC32 development board. The exercises at the end of each chapter help you put your new skills to practice. Coverage includes:

- A practical introduction to the C programming language
- Getting up and running quickly with the PIC32
- An exploration of the hardware architecture of the PIC32 and differences among PIC32 families
- Fundamentals of embedded computing with the PIC32, including the build process, time- and memory-efficient programming, and interrupts
- A peripheral reference, with extensive sample code covering digital input and output, counter/timers, PWM, analog input, input capture, watchdog timer, and communication by the parallel master port, SPI, I2C, CAN, USB, and UART
- An introduction to the Microchip Harmony programming framework
- Essential topics in mechatronics, including interfacing sensors to the PIC32, digital signal processing, theory of operation and control of brushed DC motors, motor sizing and gearing, and other actuators such as stepper motors, RC servos, and brushless DC motors

For more information on the book, and to download free sample code, please visit <http://www.nu32.org> Extensive, freely downloadable sample code for the NU32

development board incorporating the PIC32MX795F512H microcontroller Free online instructional videos to support many of the chapters

Biomechatronics is rapidly becoming one of the most influential and innovative research directions defining the 21st century. Biomechatronics will provide a complete and up-to-date account of this advanced subject at the university textbook level. Each chapter in this book will be co-authored by top industry experts in the corresponding subfield, and will be led by Professor Marko B. Popovic, researcher and educator at the forefront of advances in the biomechatronics field. Beginning with an introduction to the field and its historical background, this book will delve into the most groundbreaking and recent developments in biomechatronics, such as artificial organs and tissues, prosthetic limbs, orthotic systems, wearable systems for physical augmentation, physical therapy and rehabilitation, robotic surgery, and natural and synthetic sensors. The only biomechatronics textbook written especially for students at a university level Ideal for undergraduate and graduate students and researchers in the biomechatronics, biomechanics, robotics, and biomedical engineering fields Provides an overview of state-of-the-art science and technology of modern day biomechatronics, introduced by the leading experts in this fascinating field

The 2014 International Conference on Mechatronics Engineering and Electrical Engineering (CMEEE2014) was held October 18-19, 2014 in Sanya, Hainan, China. CMEEE2014 provided a valuable opportunity for researchers, scholars and scientists to exchange their new ideas and application experiences face to face to-

gether, to establish business or research As the complexity of automotive vehicles increases this book presents operational and practical issues of automotive mechatronics. It is a comprehensive introduction to controlled automotive systems and provides detailed information of sensors for travel, angle, engine speed, vehicle speed, acceleration, pressure, temperature, flow, gas concentration etc. The measurement principles of the different sensor groups are explained and examples to show the measurement principles applied in different types.

In this textbook, fundamental methods for model-based design of mechatronic systems are presented in a systematic, comprehensive form. The method framework presented here comprises domain-neutral methods for modeling and performance analysis: multi-domain modeling (energy/port/signal-based), simulation (ODE/DAE/hybrid systems), robust control methods, stochastic dynamic analysis, and quantitative evaluation of designs using system budgets. The model framework is composed of analytical dynamic models for important physical and technical domains of realization of mechatronic functions, such as multi-body dynamics, digital information processing and electromechanical transducers. Building on the modeling concept of a technology-independent generic mechatronic transducer, concrete formulations for electrostatic, piezoelectric, electromagnetic, and electrodynamic transducers are presented. More than 50 fully worked out design examples clearly illustrate these methods and concepts and enable independent study of the material.

The field of mechatronics integrates modern engineering science and technolo-

gies with new ways of thinking, enhancing the design of products and manufacturing processes. This synergy enables the creation and evolution of new intelligent human-oriented machines. The Handbook of Research on Advancements in Robotics and Mechatronics presents new findings, practices, technological innovations, and theoretical perspectives on the the latest advancements in the field of mechanical engineering. This book is of great use to engineers and scientists, students, researchers, and practitioners looking to develop autonomous and smart products and systems for meeting today's challenges.

Applied Biomechatronics Using Mathematical Models provides an appropriate methodology to detect and measure diseases and injuries relating to human kinematics and kinetics. It features mathematical models that, when applied to engineering principles and techniques in the medical field, can be used in assistive devices that work with bodily signals. The use of data in the kinematics and kinetics analysis of the human body, including musculoskeletal kinetics and joints and their relationship to the central nervous system (CNS) is covered, helping users understand how the complex network of symbiotic systems in the skeletal and muscular system work together to allow movement controlled by the CNS. With the use of appropriate electronic sensors at specific areas connected to bio-instruments, we can obtain enough information to create a mathematical model for assistive devices by analyzing the kinematics and kinetics of the human body. The mathematical models developed in this book can provide more effective devices for use in aiding and improving the function of the body in relation to a variety of injuries and diseases. Focuses on the mathematical

modeling of human kinematics and kinetics Teaches users how to obtain faster results with these mathematical models Includes a companion website with additional content that presents MATLAB examples

This volume treats Lagrange equations for electromechanical systems, including piezoelectric transducers and selected applications. It is essentially an extension to piezoelectric systems of the work by Crandall et al.: "Dynamics of Mechanical and Electromechanical Systems", published in 1968. The first three chapters contain classical material based on this and other well known standard texts in the field. Some applications are new and include material not published in a monograph before.

An expanded new edition of the best-selling system dynamics book using the bond graph approach A major revision of the go-to resource for engineers facing the increasingly complex job of dynamic systems design, System Dynamics, Fifth Edition adds a completely new section on the control of mechatronic systems, while revising and clarifying material on modeling and computer simulation for a wide variety of physical systems. This new edition continues to offer comprehensive, up-to-date coverage of bond graphs, using these important design tools to help readers better understand the various components of dynamic systems. Covering all topics from the ground up, the book provides step-by-step guidance on how to leverage the power of bond graphs to model the flow of information and energy in all types of engineering systems. It begins with simple bond graph models of mechanical, electrical, and hydraulic systems, then goes on to explain in detail how to model more complex systems using computer simulations. Readers will find: New mate-

rial and practical advice on the design of control systems using mathematical models New chapters on methods that go beyond predicting system behavior, including automatic control, observers, parameter studies for system design, and concept testing Coverage of electromechanical transducers and mechanical systems in plane motion Formulas for computing hydraulic compliances and modeling acoustic systems A discussion of state-of-the-art simulation tools such as MATLAB and bond graph software Complete with numerous figures and examples, *System Dynamics, Fifth Edition* is a must-have resource for anyone designing systems and components in the automotive, aerospace, and defense industries. It is also an excellent hands-on guide on the latest bond graph methods for readers unfamiliar with physical system modeling.

Mechatronic Components: Roadmap to Design explains the practical application of mechatronics, including sections on adaptive structures, robotics and other areas where mechanics and electronics converge. Professional engineers in a variety of areas will find this textbook to be extremely helpful with its in-depth use of flow diagrams and schemes that help readers understand the logic behind the design of such systems. Using approximately 130 different components with diagrams and flowcharts that help engineers from different fields understand the general properties and selection criteria of a component, this book presents a comprehensive resource on mechatronic components. Presents different concepts from the cross-disciplinary field of mechatronics, including discussions from mechanical engineering, electrical engineering and computer science Explains the decision-making process for compo-

nents with visually appealing flow diagrams Provides detailed guidance on the selection of materials and components for building mechatronic systems Includes specific cases studies that illustrate applied concepts

Now that modern machinery and electromechanical devices are typically being controlled using analog and digital electronics and computers, the technologies of mechanical engineering in such a system can no longer be isolated from those of electronic and computer engineering. *Mechatronics: A Foundation Course* applies a unified approach to meet this

This book highlights selected papers from the Mechanical Engineering track, with a focus on mechatronics and manufacturing, presented at the “Malaysian Technical Universities Conference on Engineering and Technology” (MUCET 2019). The conference brings together researchers and professionals in the fields of engineering, research and technology, providing a platform for future collaborations and the exchange of ideas.

Electromechanical systems consisting of electrical, mechanical and acoustic subsystems are of special importance in various technical fields, e.g. precision device engineering, sensor and actuator technology, electroacoustics and medical engineering. Based on a circuit-oriented representation, providing readers with a descriptive engineering design method for these systems is the goal of this textbook. It offers an easy and fast introduction to mechanical, acoustic, fluid, thermal and hydraulic problems through the application of circuit-oriented basic knowledge. The network description methodology, presented in detail, is extended to finite network elements and combined with the finite element method (FEM): the combination of the ad-

vantages of both description methods results in novel approaches, especially in the higher frequency range. The book offers numerous current examples of both the design of sensors and actuators and that of direct coupled sensor-actuator systems. The appendix provides more extensive fundamentals for signal description, as well as a compilation of important material characteristics. The textbook is suitable both for graduate students and for engineers working in the fields of electrical engineering, information technology, mechatronics, microtechnology, and mechanical and medical engineering.

This book is intended for both mechanical and electronics engineers (researchers and graduate students) who wish to get some training in smart electronics devices embedded in mechanical systems. The book is partly a textbook and partly a monograph. It is a textbook as it provides a focused interdisciplinary experience for undergraduates that encompass important elements from traditional courses as well as contemporary developments in Mechatronics. It is simultaneously a monograph because it presents several new results and ideas and further developments and explanation of existing algorithms which are brought together and published in the book for the first time.

Cutting-edge coverage of mechatronics in medical systems *Mechatronics in Medicine: A Biomedical Engineering Approach* describes novel solutions for utilizing mechatronics to design innovative, accurate, and intelligent medical devices and optimize conventional medical instruments. After an introduction to mechatronics, the book addresses sensing technologies, actuators and feedback sensors, mechanisms and mechanical de-

vices, and processing and control systems. Artificial intelligence, expert systems, and medical imaging are also covered. This pioneering guide concludes by discussing applications of mechatronics in medicine and biomedical engineering and presenting seven real-world medical case studies. In-depth details on: Sensing technology Electromechanical, fluid, pneumatic power, and other types of actuators Feedback sensors Mechanisms, mechanical devices, and their functions Principles and methods of processing and controlling mechatronics systems Artificial intelligence, expert systems, artificial neural networks, fuzzy systems, and neuro fuzzy systems Medical imaging, including ultrasound, MRI, CT scan, and nuclear imaging Medical case studies in mechatronics

An Introduction to Mechanical Engineering is an essential text for all first-year undergraduate students as well as those studying for foundation degrees and HNDs. The text gives a thorough grounding in the following core engineering topics: thermodynamics, fluid mechanics, solid mechanics, dynamics, electricals and electronics, and materials science

Accessible to all readers, including students of secondary school and amateur technology enthusiasts, *Robotics, Mechatronics, and Artificial Intelligence* simplifies the process of finding basic circuits to perform simple tasks, such as how to control a DC or step motor, and provides instruction on creating moving robotic parts, such as an "eye" or an "ear." Though many companies offer kits for project construction, most experimenters want to design and build their own robots and other creatures specific to their needs and goals. With this new book by Newton Braga, hobbyists and experimenters around the world will be able to decide what skills they want to

feature in a project and then choose the right "building blocks" to create the ideal results. In the past few years the technology of robotics, mechatronics, and artificial intelligence has exploded, leaving many people with the desire but not the means to build their own projects. The author's fascination with and expertise in the exciting field of robotics is demonstrated by the range of simple to complex project blocks he provides, which are designed to benefit both novice and experienced robotics enthusiasts. The common components and technology featured in the project blocks are especially beneficial to readers who need practical solutions that can be implemented easily by their own hands, without incorporating expensive, complicated technology. Accessible to technicians and hobbyists with many levels of experience, and written to provide inexpensive and creative fun with robotics Appeals to all sorts of technology enthusiasts, including those involved with electronics, computers, home automation, mechanics, and other areas

This updated second edition broadens the explanation of rotational kinematics and dynamics — the most important aspect of rigid body motion in three-dimensional space and a topic of much greater complexity than linear motion. It expands treatment of vector and matrix, and includes quaternion operations to describe and analyze rigid body motion which are found in robot control, trajectory planning, 3D vision system calibration, and hand-eye coordination of robots in assembly work, etc. It features updated treatments of concepts in all chapters and case studies. The textbook retains its comprehensiveness in coverage and compactness in size, which make it easily accessible to the readers

from multidisciplinary areas who want to grasp the key concepts of rigid body mechanics which are usually scattered in multiple volumes of traditional textbooks. Theoretical concepts are explained through examples taken from across engineering disciplines and links to applications and more advanced courses (e.g. industrial robotics) are provided. Ideal for students and practitioners, this book provides readers with a clear path to understanding rigid body mechanics and its significance in numerous sub-fields of mechanical engineering and related areas.

The popular evil genius format provides hobbyists with a fun and inexpensive way to learn Mechatronics (the merger of electronics and mechanics) via 25 complete projects. Projects include: mechanical race car, combat robot, ionic motor, electromagnet, robotic arm, light beam remote control, and more Includes "parts lists" and "tool bin" for each project Covers all the preparation needed to begin building, such as "how to solder," "how to recognize components and diagrams," "how to read a schematic," etc.

Control Systems Design of Bio-Robotics and Bio-Mechatronics with Advanced Applications delivers essential and advanced bioengineering information on the application of control and robotics technologies in the life sciences. Judging by what we have witnessed so far, this exciting field of control systems and robotics in bioengineering is likely to produce revolutionary breakthroughs over the next decade. While this book is intended for senior undergraduate or graduate students in both control engineering and biomedical engineering programs, it will also appeal to medical researchers and practitioners who want to enhance their quantitative understanding of physiological processes. Focuses

on the engineering and scientific principles underlying the extraordinary performance of biomedical robotics and biomechanics Demonstrates the application of principles for designing corresponding algorithms Presents the latest innovative approaches to medical diagnostics and procedures, as well as clinical rehabilitation from the point-of-view of dynamic modeling, system analysis and control

Aimed at scientists and engineers who specialise in integrated electro-mechanical drives, as well as researchers and students, this fundamental guide to the practical applications of mechatronics is applicable to transportation systems, industrial production processes, aerospace, aviation and automotive industries.

Due to the enormous impact of mechatronics systems, we encounter mechatronics and micromechatronic systems in our daily activities. Recent trends and novel technologies in engineering have increased the emphasis on integrated analysis, design, and control. This book examines motion devices (actuators, motors, transducers and sensors), power electronics, controllers, and electronic solutions with the main emphasis placed on high-performance mechatronic systems. Analysis, design, optimization, control, and implementation issues, as well as a variety of enabling mechatronic systems and devices, are also covered. The results extend from the scope of mechatronic systems to the modern hardware--software developments, utilizing enabling solutions and placing the integrated system perspectives in favor of consistent engineering solutions. Mechatronics and Control of Electromechanical Systems facilitates comprehensive studies and covers the design aspects of mecha-

tronic systems with high-performance motion devices. By combining traditional engineering topics and subjects with the latest technologies and developments, new advances are stimulated in design of state-of-the-art mechatronic systems. This book provides a deep understanding of the engineering underpinnings of integrated technologies.

With a focus on electromechanical systems in a variety of fields, this accessible introductory text brings you coverage of the full range of electrical mechanical devices used today. You'll gain a comprehensive understanding of the design process and get valuable insights into good design practice. UNDERSTANDING ELECTROMECHANICAL ENGINEERING will be of interest to anyone in need of a non-technical, interdisciplinary introduction to the thriving field of mechatronics.

Featuring selected contributions from the 2nd International Conference on Mechatronics and Robotics Engineering, held in Nice, France, February 18-19, 2016, this book introduces recent advances and state-of-the-art technologies in the field of advanced intelligent manufacturing. This systematic and carefully detailed collection provides a valuable reference source for mechanical engineering researchers who want to learn about the latest developments in advanced manufacturing and automation, readers from industry seeking potential solutions for their own applications, and those involved in the robotics and mechatronics industry.

Introduction to Mechatronics discusses the design of simpler, more economical, reliable, and versatile systems based on the principles of mechanics, electronics, and computing. The book describes the historical development of mechatronic systems and provides a basic background for mechatronic systems engi-

neering. The introductory topics on mechatronics are dealt with in the book and it will prove to be very useful for undergraduate and postgraduate students as well as practice engineers. Beginning with the basic concepts of mechatronic systems, the book provides a comprehensive coverage of topics including system modelling and analysis, application of microprocessors and microcontrollers in mechatronic systems, sensors and actuators in mechatronic systems, intelligent systems for accurate operation of mechatronic systems, and application of mechatronic systems in autotronics, bionics, and avionics.

Learn how to study, analyze, select, and design a successful mechatronic product. This innovative, cutting-edge publication presents the essential nature of mechatronics, a field at the crossroads of information technology and mechanical and electrical engineering. Readers learn how to blend mechanisms, electronics, sensors, control strategies, and software into a functional design. Given the breadth that the field of mechatronics draws upon, this publication provides a critical service to readers by paring down the topics to the most essential ones. A common thread throughout the publication is tailoring performance to the actual needs of the user, rather than designing "by the book." Practical methods clarify engineering trade-offs needed to design and manufacture competitive state-of-the-art products and systems. Key features include: * Easy-to-construct set of laboratory experiments to give readers practice in controlling difficult systems using discrete-time algorithms * Essentials of control theory, concentrating on state-space and easily constructed simulations in JavaScript, including typical mechatronic systems with gross nonlinearities where

linear methods give the "wrong answer" * Hot topics that include advances in the automotive, multimedia, robotics, defense, medical, and consumer industries * Author-provided Web site at www.EssMech.com offers additional resources, including videos, dynamic simulation examples, software tools, and downloads. There are hundreds of choices involved in all but the simplest of mechatronic design tasks. Using this publication as a reference, electrical, mechanical, and computer designers and engineers can find the most efficient, cost-effective methods to transform their goals into successful commercial products. With its use of laboratory experiments, this publication is also recommended as a graduate-level textbook. Author Web site located at www.EssMech.com provides in-depth support material that includes links to simulations for modeling dynamic systems with real-time interactions, image processing examples, and 3D robot modeling software, enabling readers to "construct" and manipulate their own mechanism as well as other useful links. The first comprehensive and up-to-date reference on mechatronics, Robert Bishop's *The Mechatronics Handbook* was quickly embraced as the gold standard in the field. With updated coverage on all aspects of mechatronics, *The Mechatronics Handbook, Second Edition* is now available as a two-volume set. Each installment offers focused coverage of a particular area of mechatronics, supplying a convenient and flexible source of specific information. This seminal work is still the most exhaustive, state-of-the-art treatment of the field available. Focusing on the most rapidly changing areas of mechatronics, this book discusses signals and systems control, computers, logic systems, software, and data acquisi-

tion. It begins with coverage of the role of control and the role modeling in mechatronic design, setting the stage for the more fundamental discussions on signals and systems. The volume reflects the profound impact the development of not just the computer, but the microcomputer, embedded computers, and associated information technologies and software advances. The final sections explore issues surrounding computer software and data acquisition. Covers modern aspects of control design using optimization techniques from H2 theory Discusses the roles of adaptive and nonlinear control and neural networks and fuzzy systems Includes discussions of design optimization for mechatronic systems and real-time monitoring and control Focuses on computer hardware and associated issues of logic, communication, networking, architecture, fault analysis, embedded computers, and programmable logic controllers

A modern and unified treatment of the

mechanics, planning, and control of robots, suitable for a first course in robotics.

The objective of FUNDAMENTALS OF MECHATRONICS is to cover both hardware and software aspects of mechatronics systems in a single text, giving a complete treatment to the subject matter. The text focuses on application considerations and relevant practical issues that arise in the selection and design of mechatronics components and systems. The text uses several programming languages to illustrate the key topics. Different programming platforms are presented to give instructors the choice to select the programming language most suited to their course objectives. A separate laboratory book, with additional exercises is provided to give guided hands-on experience with many of the topics covered in the text. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.