

Springer Handbook Of Robotics

The objective of this book is to provide the reader with a comprehensive coverage on the Robot Operating Systems (ROS) and latest related systems, which is currently considered as the main development framework for robotics applications. The book includes twenty-seven chapters organized into eight parts. Part 1 presents the basics and foundations of ROS. In Part 2, four chapters deal with navigation, motion and planning. Part 3 provides four examples of service and experimental robots. Part 4 deals with real-world deployment of applications. Part 5 presents signal-processing tools for perception and sensing. Part 6 provides software engineering methodologies to design complex software with ROS. Simulations frameworks are presented in Part 7. Finally, Part 8 presents advanced tools and frameworks for ROS including multi-master extension, network introspection, controllers and cognitive systems. This book will be a valuable companion for ROS users and developers to learn more ROS capabilities and features.

A modern and unified treatment of the mechanics, planning, and control of robots, suitable for a first course in robotics.

This book will show you how to use your Arduino to control a variety of different robots, while providing step-by-step instructions on the entire robot building process. You'll learn Arduino basics as well as the characteristics of different types of motors used in robotics. You also discover controller methods and failsafe methods, and learn how to apply them to your project. The book starts with basic robots and moves into more complex projects, including a GPS-enabled robot, a robotic lawn mower, a fighting bot, and even a DIY Segway-clone. Introduction to the Arduino and other components needed for robotics Learn how to build motor controllers Build bots from simple line-following and bump-sensor bots to more complex robots that can mow your lawn, do battle, or even take you for a ride Please note: the print version of this title is black & white; the eBook is full color.

In Computer-Integrated Surgery leading researchers and clinical practitioners describe the exciting new partnership that is being forged between surgeons and machines such as computers and robots, enabling them to perform certain skilled tasks better than either can do alone.The 19 chapters in part I, Technology, explore the components -- registration, basic tools for surgical planning, human-machine interfaces, robotic manipulators, safety -- that are the basis of computer-integrated surgery. These chapters provide essential background material needed to get up to speed on current work as well as a ready reference for those who are already active in the field.The 39 chapters in part II, Applications, cover eight clinical areas -- neurosurgery, orthopedics, eye surgery, dentistry, minimal access surgery, ENT surgery, craniofacial surgery, and radiotherapy -- with a concluding chapter on the high-tech operating room. Each section contains a brief introduction as well as at least one "requirements and opportunities" chapter written by a leading clinician in the area under discussion.

Technology and Clinical Applications

Springer Handbook of Petroleum Technology

Introduction to Humanoid Robotics

Modelling, Planning and Control

Humanoid Robotics: A Reference

Transferring Theory to Application

Studies on robotics applications have grown substantially in recent years, with swarm robotics being a relatively new area of research. Inspired by studies in swarm intelligence and robotics, swarm robotics facilitates interactions between robots as well as their interactions with the environment. The Handbook of Research on Design, Control, and Modeling of Swarm Robotics is a collection of the most important research achievements in swarm robotics thus far, covering the growing areas of design, control, and modeling of swarm robotics. This handbook serves as an essential resource for researchers, engineers, graduates, and senior undergraduates with interests in swarm robotics and its applications.

This book provides readers with basic concepts and design theories for space robots and presents essential methodologies for implementing space robot engineering by introducing several concrete projects as illustrative examples. Readers will gain a comprehensive understanding of professional theories in the field of space robots, and will find an initial introduction to the engineering processes involved in developing space robots. Rapid advances in technologies such as the Internet of Things, Cloud Computing, and Artificial Intelligence have also produced profound changes in space robots. With the continuous expansion of human exploration of the universe, it is imperative for space robots to be capable of sharing knowledge, working collaboratively, and becoming more and more intelligent so as to optimize the utilization of space resources. For on-orbit robots that perform service tasks such as spacecraft assembly and maintenance, as well as exploration robots that carry out research tasks on planetary surfaces, the rational integration into a network system can greatly improve their capabilities in connection with executing outer space tasks, such as information gathering and utilization, independent decision-making and planning, risk avoidance, and reliability, while also significantly reducing resource consumption for the system as a whole.

Papers from a flagship robotics conference that cover topics ranging from kinematics to human-robot interaction and robot perception. Robotics: Science and Systems VI spans a wide spectrum of robotics, bringing together researchers working on the foundations of robotics, robotics applications, and the analysis of robotics systems. This volume presents the proceedings of the sixth Robotics: Science and Systems conference, held in 2010 at the University of Zaragoza, Spain. The papers presented cover a wide range of topics in robotics, spanning 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.

Written for senior level or first year graduate level robotics courses, this text includes material from traditional mechanical engineering, control theoretical material and computer science. It includes coverage of rigid-body transformations and forward and inverse positional kinematics.

Underwater Robots

Springer Handbook of Mechanical Engineering

Computer-integrated Surgery

Build and Program Real Autonomous Robots Using Raspberry Pi (English Edition)

Arduino Robotics

Modelling and Control of Robot Manipulators

The author has maintained two open-source MATLAB Toolboxes for more than 10 years: one for robotics and one for vision. The key strength of the Toolboxes provide a set of tools that allow the user to work with real problems, not trivial examples. For the student the book makes the algorithms accessible, the Toolbox code can be read to gain understanding, and the examples illustrate how it can be used—instant gratification in just a couple of lines of MATLAB code. The code can also be the starting point for new work, for researchers or students, by writing programs based on Toolbox functions, or modifying the Toolbox code itself. The purpose of this book is to expand on the tutorial material provided with the toolboxes, add many more examples, and to weave this into a narrative that covers robotics and computer vision separately and together. The author shows how complex problems can be decomposed and solved using just a few simple lines of code, and hopefully to inspire up and coming researchers. The topics covered are guided by the real problems observed over many years as a practitioner of both robotics and computer vision. It is written in a light but informative style, it is easy to read and absorb, and includes a lot of Matlab examples and figures. The book is a real walk through the fundamentals of robot kinematics, dynamics and joint level control, then camera models, image processing, feature extraction and epipolar geometry, and bring it all together in a visual servo system. Additional material is provided at <http://www.petercorke.com/RVC>

This resource covers all areas of interest for the practicing engineer as well as for the student at various levels and educational institutions. It features the work of authors from all over the world who have contributed their expertise and support the globally working engineer in finding a solution for today's mechanical engineering problems. Each subject is discussed in detail and supported by numerous figures and tables.

While Robotic Process Automation (RPA) has been around for about 20 years, it has hit an inflection point because of the convergence of cloud computing, big data and AI. This book shows you how to leverage RPA effectively in your company to automate repetitive and rules-based processes, such as scheduling, inputting/transferring data, cut and paste, filling out forms, and search. Using practical aspects of implementing the technology (based on case studies and industry best practices), you'll see how companies have been able to realize substantial ROI (Return On Investment) with their implementations, such as by lessening the need for hiring or outsourcing. By understanding the core concepts of RPA, you'll also see that the technology significantly increases compliance – leading to fewer issues with regulations – and minimizes costly errors. RPA software revenues have recently soared by over 60 percent, which is the fastest ramp in the tech industry, and they are expected to exceed \$1 billion by the end of 2019. It is generally seamless with legacy IT environments, making it easier for companies to pursue a strategy of digital transformation and can even be a gateway to AI. The Robotic Process Automation Handbook puts everything you need to know into one place to be a part of this wave. What You'll Learn Develop the right strategy and planDeal with resistance and fears from employeesTake an in-depth look at the leading RPA systems, including where they are most effective, the risks and the costsEvaluate an RPA system Who This Book Is For IT specialists and managers at mid-to-large companies

The research areas as well as the knowledge gained for the practical use of robots are growing and expanding beyond manufacturing and industrial automation, making inroads in sectors such as health care and terrain sensing, as well as general assistive systems working in close interaction with humans. In a situation like this, it is necessary for future robot systems to become less stiff and more specialized by taking inspiration from the mechanical compliance and versatility found in natural materials and organisms. At present, a new discipline is emerging in this area, called »Soft Robotics«. It particularly challenges the traditional thinking of engineers, as the confluence of technologies, ranging from new materials, sensors, actuators and production techniques to new design tools, will make it possible to create new systems whose structures are almost completely made of soft materials, which bring about entirely new functions and behaviors, similar in many ways to natural systems. These Proceedings focus on four main topics: • Soft Actuators and Control • Soft Interactions • Soft Robot Assistants: Potential and Challenges • Human-centered »Soft Robotics«.

The Robotics Primer

Robot Programming by Demonstration

A Guide to Implementing RPA Systems

Fundamental Algorithms in MATLAB

Science and Systems VI

Springer Handbook of Automation

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.

It is at least two decades since the conventional robotic manipulators have become a common manufacturing tool for different industries, from automotive to pharmaceutical. The proven benefits of utilizing robotic manipulators for manufacturing in different industries motivated scientists and researchers to try to extend the applications of robots to many other areas by inventing several new types of robots other than conventional manipulators. The new types of robots can be categorized in two groups: redundant (and hyper-redundant) manipulators, and mobile (ground, marine, and aerial) robots. These groups of robots, known as advanced robots, have more freedom for their mobility, which allows them to do tasks that the conventional manipulators cannot do. Engineers have taken advantage of the extra mobility of the advanced robots to make them work in constrained environments, ranging from limited joint motions for redundant (or hyper-redundant) manipulators to obstacles in the way of mobile (ground, marine, and aerial) robots. Since these constraints usually depend on the work environment, they are variable. Engineers have had to invent methods to allow the robots to deal with a variety of constraints automatically. A robot that is equipped with those methods is called an Autonomous Robot. Autonomous Robots: Kinematics, Path Planning, and Control covers the kinematics and dynamic modeling/analysis of Autonomous Robots, as well as the methods suitable for their control. The text is suitable for mechanical and electrical engineers who want to familiarize themselves with methods of modeling/analysis/control that have been proven efficient through research.

This handbook provides a comprehensive but concise reference resource for the vast field of petroleum technology. Built on the successful book "Practical Advances in Petroleum Processing" published in 2006, it has been extensively revised and expanded to include upstream technologies. The book is divided into four parts: The first part on petroleum characterization offers an in-depth review of the chemical composition and physical properties of petroleum, which determine the possible uses and the quality of the products. The second part provides a brief overview of petroleum geology and upstream practices. The third part exhaustively discusses established and emerging refining technologies from a practical perspective, while the final part describes the production of various refining products, including fuels and lubricants, as well as petrochemicals, such as olefins and polymers. It also covers process automation and real-time refinery-wide process optimization. Two key chapters provide an integrated view of petroleum technology, including environmental and safety issues.Written by international experts from academia, industry and research institutions, including integrated oil companies, catalyst suppliers, licensors, and consultants, it is an invaluable resource for researchers and graduate students as well as practitioners and professionals.

This open access book bridges the gap between playing with robots in school and studying robotics at the upper undergraduate and graduate levels to prepare for careers in industry and research. Robotic algorithms are presented formally, but using only mathematics known by high-school and first-year college students, such as calculus, matrices and probability. Concepts and algorithms are explained through detailed diagrams and calculations. Elements of Robotics presents an overview of different types of robots and the components used to build robots, but focuses on robotic algorithms: simple algorithms like odometry and feedback control, as well as algorithms for advanced topics like localization, mapping, image processing, machine learning and swarm robotics. These algorithms are demonstrated in simplified contexts that enable detailed computations to be performed and feasible activities to be posed. Students who study these simplified demonstrations will be well prepared for advanced study of robotics. The algorithms are presented at a relatively abstract level, not tied to any specific robot. Instead a generic robot is defined that uses elements common to most educational robots: differential drive with two motors, proximity sensors and some method of displaying output to the user. The theory is supplemented with over 100 activities, most of which can be successfully implemented using inexpensive educational robots. Activities that require more computation can be programmed on a computer. Archives are available with suggested implementations for the Thymio robot and standalone programs in Python.

Robotics and Automation Handbook

A Practical Introduction to the Robot Operating System

Motion and Force Control of Vehicle-Manipulator Systems

Military Robots and Drones: A Reference Handbook

The Biology, Intelligence, and Technology of Self-Organizing Machines

Robotics

A major new professional reference work on fingerprint security systems and technology from leading international researchers in the field. Handbook provides authoritative and comprehensive coverage of all major topics, concepts, and methods for fingerprint security systems. This unique reference work is an absolutely essential resource for all biometric security professionals, researchers, and systems administrators.

With the science of robotics undergoing a major transformation just now, Springer 's new, authoritative handbook on the subject couldn 't have come at a better time. Having broken free from its origins in industry, robotics has been rapidly expanding into the challenging terrain of unstructured environments. Unlike other handbooks that focus on industrial applications, the Springer Handbook of Robotics incorporates these new developments. Just like all Springer Handbooks, it is utterly comprehensive, edited by internationally renowned experts, and replete with contributions from leading researchers from around the world. The handbook is an ideal resource for robotics experts but also for people new to this expanding field.

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.

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 astronomical science.

Mobile Robot Design and Applications with Embedded Systems

Evolutionary Robotics

Modern Robotics

A Mathematical Introduction to Robotic Manipulation

Handbook of Fingerprint Recognition

Mechanics and Control

Humanoid Robotics provides a comprehensive compilation of developments in the conceptualization, design and development of humanoid robots and related technologies. Human beings have built the environment they occupy (living spaces, instruments and vehicles) to suit two-legged systems. Building systems, especially in robotics, that are compatible with the well-established, human-based surroundings and which could naturally interact with humans is an ultimate goal for all researches and engineers. Humanoid Robots are systems (i.e. robots) which mimic human behavior. Humanoids provide a platform to study the construction of systems that behave and interact like humans. A broad range of applications ranging from daily housework to complex medical surgery, deep ocean exploration, and other potentially dangerous tasks are possible using humanoids. In addition, the study of humanoid robotics provides a platform to understand the mechanisms and offers a physical visual of how humans interact, think, and react with the surroundings and how such behaviors could be reassembled and reconstructed. Currently, the most challenging issue with bipedal humanoids is to make them balance on two legs. The purportedly simple act of finding the best balance that enables easy walking, jumping and running requires some of the most sophisticated development of robotic systems— those that will ultimately mimic fully the diversity and dexterity of human beings. Other typical human-like interactions such as complex thought and conversations on the other hand, also pose barriers for the development of humanoids because we are yet to understand fully the way in which we humans interact with our environment and consequently to replicate this in humanoids.

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.

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.

This book provides an insightful introduction to the most important field of military innovation for the 21st century—robotic and drone weaponry. • A chronology of important events in robotic technology • A detailed bibliography on the latest sources related to this innovative technology

The Complete Reference (Volume 1)

A Reference Handbook

Robotics, Vision and Control

Encyclopedia of Robotics

Elements of Robotics

Soft Robotics

The second edition of this handbook provides a state-of-the-art cover view 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.

Want to develop novel robot applications, but don't know how to write a mapping or object-recognition system? You're not alone, but you're certainly not without help. By combining real-world examples with valuable knowledge from the Robot Operating System (ROS) community, this practical book provides a set of motivating recipes for solving specific robotics use cases. Ideal for enthusiasts, from students in robotics clubs to professional robotics scientists and engineers, each recipe describes a complete solution using ROS open source libraries and tools. You'll learn how to complete tasks described in the recipes, as well as how to configure and recombine components for other tasks. If you're familiar with Python, you're ready to go. Learn fundamentals, including key ROS concepts, tools, and patterns Program robots that perform an increasingly complex set of behaviors, using the powerful packages in ROS See how to easily add perception and navigation abilities to your robots Integrate your own sensors, actuators, software libraries, and even a whole robot into the ROS ecosystem Learn tips and tricks for using ROS tools and community resources, debugging robot behavior, and using C++ in ROS

An overview of the basic concepts and methodologies of evolutionary robotics, which views robots as autonomous artificial organisms that develop their own skills in close interaction with the environment and without human intervention.

This book deals with the state of the art in underwater robotics experiments of dynamic control of an underwater vehicle. The author presents experimental results on motion control and fault tolerance to thrusters' faults with the autonomous vehicle ODIN. This second substantially improved and expanded edition new features are presented dealing with fault-tolerant control and coordinated control of autonomous underwater vehicles.

Springer Handbook of Robotics

Handbook of Unmanned Aerial Vehicles

Introduction to Robotics

Programming Robots with ROS

Practical Robotics in C++

Autonomous Robots

This book is for researchers, engineers, and students who are willing to understand how humanoid robots move and be controlled. The book starts with an overview of the humanoid robotics research history and state of the art. Then it explains the required mathematics and physics such as kinematics of multi-body system, Zero-Moment Point (ZMP) and its relationship with body motion. Biped walking control is discussed in depth, since it is one of the main interests of humanoid robotics. Various topics of the whole body motion generation are also discussed. Finally multi-body dynamics is presented to simulate the complete dynamic behavior of a humanoid robot. Throughout the book, Matlab codes are shown to test the algorithms and to help the reader's understanding.

Recent advances in RbD have identified a number of key issues for ensuring a generic approach to the transfer of skills across various agents and contexts. This book focuses on the two generic questions of what to imitate and how to imitate and proposes active teaching methods.

An easy-to-follow guide that will help you build robots using with ease KEY FEATURES ● Simplified coverage on fundamentals of building a robot platform. ● Learn to program Raspberry Pi for interacting with hardware. ● Cutting-edge coverage on autonomous motion, mapping, and path planning algorithms for advanced robotics. DESCRIPTION Practical Robotics in C++ teaches the complete spectrum of Robotics, right from the setting up a computer for a robot controller to putting power to the wheel motors. The book brings you the workshop knowledge of the electronics, hardware, and software for building a mobile robot platform. You will learn how to use sensors to detect obstacles, how to train your robot to build itself a map and plan an obstacle-avoiding path, and how to structure your code for modularity and interchangeability with other robot projects. Throughout the book, you can experience the demonstrations of complete coding of robotics with the use of simple and clear C++ programming. In addition, you will explore how to leverage the Raspberry Pi GPIO hardware interface pins and existing libraries to make an incredibly capable machine on the most affordable computer platform ever. WHAT YOU WILL LEARN ● Write code for the motor drive controller. ● Build a Map from Lidar Data. ● Write and implement your own autonomous path-planning algorithm. ● Write code to send path waypoints to the motor drive controller autonomously. ● Get to know more about robot mapping and navigation. WHO THIS BOOK IS FOR This book is most suitable for C++ programmers who have keen interest in robotics and hardware programming. All you need is just a good understanding of C++ programming to get the most out of this book. TABLE OF CONTENTS 1. Choose and Set Up a Robot Computer 2. GPIO Hardware Interface Pins Overview and Use 3. The Robot Platform 4. Types of Robot Motors and Motor Control 5. Communication with Sensors and other Devices 6. Additional Helpful Hardware 7. Adding the Computer to Control your Robot 8. Robot Control Strategy 9. Coordinating the Parts 10. Maps for Robot Navigation 11. Robot Tracking and Localization 12. Autonomous Motion 13. Autonomous Path Planning 14. Wheel Encoders for Odometry 15. Ultrasonic Range Detectors 16. IMUs: Accelerometers, Gyroscopes, and Magnetometers 17. GPS and External Beacon Systems 18. LIDAR Devices and Data 19. Real Vision with Cameras 20. Sensor Fusion 21. Building and Programming an Autonomous Robot

The Handbook of Unmanned Aerial Vehicles is a reference text for the academic and research communities, industry, manufacturers, users, practitioners, Federal Government, Federal and State Agencies, the private sector, as well as all organizations that are and will be using unmanned aircraft in a wide spectrum of applications. The Handbook covers all aspects of UAVs, from design to logistics and ethical issues. It is also targeting the young investigator, the future inventor and entrepreneur by providing an overview and detailed information of the state-of-the-art as well as useful new concepts that may lead to innovative research. The contents of the Handbook include material that addresses the needs and 'know how' of all of the above sectors targeting a very diverse audience. The Handbook offers a unique and comprehensive treatise of everything one needs to know about unmanned aircrafts, from conception to operation, from technologies to business activities, users, OEMs, reference sources, conferences, publications, professional societies, etc. It should serve as a Thesaurus, an indispensable part of the library for everyone involved in this area. For the first time, contributions by the world's top experts from academia, industry, government and the private sector, are brought together to provide unique perspectives on the current state-of-the-art in UAV, as well as future directions. The Handbook is intended for the expert/practitioner who seeks specific technical/business information, for the technically-oriented scientists and engineers, but also for the novice who wants to learn more about the status of UAV and UAV-related technologies. The Handbook is arranged in a user-friendly format, divided into main parts referring to: UAV Design Principles; UAV Fundamentals; UAV Sensors and Sensing Strategies; UAV Propulsion; UAV Control; UAV Communication Issues; UAV Architectures; UAV Health Management Issues; UAV Modeling, Simulation, Estimation and Identification; MAVs and Bio-Inspired UAVs; UAV Mission and Path Planning; UAV Autonomy; UAV Sense, Detect and Avoid Systems; Networked UAVs and UAV Swarms; UAV Integration into the National Airspace; UAV-Human Interfaces and Decision Support Systems; Human Factors and Training; UAV Logistics Support; UAV Applications; Social and Ethical Implications; The Future of UAVs. Each part is written by internationally renowned authors who are authorities in their respective fields. The contents of the Handbook supports its unique character as a thorough and comprehensive reference book directed to a diverse audience of technologists, businesses, users and potential users, managers and decision makers, novices and experts, who seek a holistic volume of information that is not only a technical treatise but also a source for answers to several questions on UAV manufacturers, users, major players in UAV research, costs, training required and logistics issues.

An Introduction to Space Robotics

Embedded Robotics

Robot Operating System (ROS)

Springer Handbook of Medical Technology

Modeling, Path Planning, and Control

Space Robotics

This book presents a unique examination of mobile robots and embedded systems, from introductory to intermediate level. It is structured in three parts, dealing with Embedded Systems (hardware and software design, actuators, sensors, PID control, multitasking), Mobile Robot Design (driving, balancing, walking, and flying robots), and Mobile Robot Applications (mapping, robot soccer, genetic algorithms, neural networks, behavior-based systems, and simulation). The book is written as a text for courses in computer science, computer engineering, IT, electronic engineering, and mechatronics, as well as a guide for robot hobbyists and researchers.

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/>

This concise, user-oriented and up-to-date desk reference offers a broad introduction to the fascinating world of medical technology, fully considering today's progress and further development in all relevant fields. The Springer Handbook of Medical Technology is a systemized and well-structured guideline which distinguishes itself through simplification and condensation of complex facts. This book is an indispensable resource for professionals working directly or indirectly with medical systems and appliances every day. It is also meant for graduate and post graduate students in hospital management, medical engineering, and medical physics.

This handbook incorporates new developments in automation. It also presents a widespread and well-structured conglomeration of new emerging application areas, such as medical systems and health, transportation, security and maintenance, service, construction and retail as well as production or logistics. The handbook is not only an ideal resource for automation experts but also for people new to this expanding field.

The Robotic Process Automation Handbook

Space Robotics: Dynamics and Control

Handbook of Research on Design, Control, and Modeling of Swarm Robotics

A broadly accessible introduction to robotics that spans the most basic concepts and the most novel applications; for students, teachers, and hobbyists. The Robotics Primer offers a broadly accessible introduction to robotics for students at pre-university and university levels, robot hobbyists, and anyone interested in this burgeoning field. The text takes the reader from the most basic concepts (including perception and movement) to the most novel and sophisticated applications and topics (humanoids, shape-shifting robots, space robotics), with an emphasis on what it takes to create autonomous intelligent robot behavior. The core concepts of robotics are carried through from fundamental definitions to more complex explanations, all presented in an engaging, conversational style that will appeal to readers of different backgrounds. The Robotics Primer covers such topics as the definition of robotics, the history of robotics ("Where do Robots Come From?"), robot components, locomotion, manipulation, sensors, control, control architectures, representation, behavior ("Making Your Robot Behave"), navigation, group robotics, learning, and the future of robotics (and its ethical implications). To encourage further engagement, experimentation, and course and lesson design, The Robotics Primer is accompanied by a free robot programming exercise workbook that implements many of the ideas on the book on iRobot platforms. The Robotics Primer is unique as a principled, pedagogical treatment of the topic that is accessible to a broad audience; the only prerequisites are curiosity and attention. It can be used effectively in an educational setting or more informally for self-instruction. The Robotics Primer is a springboard for readers of all backgrounds—including students taking robotics as an elective outside the major, graduate students preparing to specialize in robotics, and K-12 teachers who bring robotics into their classrooms.

The Encyclopedia of Robotics addresses the existing need for an easily accessible yet authoritative and granular knowledge resource in robotic science and engineering. The encyclopedia is a work that comprehensively explains the scientific, application-based, interactive and socio-ethical parameters of robotics. It is the first work that explains at the concept and fact level the state of the field of robotics and its future directions. The encyclopedia is a complement to Springer's highly successful Handbook of Robotics that has analyzed the state of robotics through the medium of descriptive essays. Organized in an A-Z format for quick and easy understanding of both the basic and advanced topics across a broad spectrum of areas in a self-contained form. The entries in this Encyclopedia will be a comprehensive description of terms used in robotics science and technology. Each term, when useful, is described concisely with online illustrations and enhanced user interactivity (on SpringerReference.com).

The author gives a rigorous, comprehensive coverage of space robotics. His mechatronic approach could be used as a general introduction to mechatronic engineering.