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Robotics, Vision and Control

Fundamental Algorithms in MATLAB

Springer Science & Business Media **The practice of robotics and computer vision both involve the application of computational algorithms to data. Over the fairly recent history of the fields of robotics and computer vision a very large body of algorithms has been developed. However this body of knowledge is something of a barrier for anybody entering the field, or even looking to see if they want to enter the field — What is the right algorithm for a particular problem?, and importantly, How can I try it out without spending days coding and debugging it from the original research papers? 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**

Robotic Vision

Fundamental Algorithms in MATLAB®

Springer Nature **This textbook offers a tutorial introduction to robotics and Computer Vision which is light and easy to absorb. The practice of robotic vision involves the application of computational algorithms to data. Over the fairly recent history of the fields of robotics and computer vision a very large body of algorithms has been developed. However this body of knowledge is something of a barrier for anybody entering the field, or even looking to see if they want to enter the field — What is the right algorithm for a particular problem?, and importantly: How can I try it out without spending days coding and debugging it from the original research papers? 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 light and color, camera modelling, image processing, feature extraction and multi-view geometry, and bring it all together in a visual servo system. "An authoritative book, reaching across fields, thoughtfully conceived and brilliantly accomplished Oussama Khatib, Stanford

Robotics and Control

Fundamental Algorithms in MATLAB®

Springer Nature **This textbook offers a tutorial introduction to robotics and control which is light and easy to absorb. The practice of robotics and control both involve the application of computational algorithms to data. Over the fairly recent history of the fields of robotics and control a very large body of algorithms has been developed. However this body of knowledge is something of a barrier for anybody entering the field, or even looking to see if they want to enter the field — What is the right algorithm for a particular problem?, and importantly: How can I try it out without spending days coding and debugging it from the original research papers? 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 provides 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 control 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 control. 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, and covers both mobile robots (control, path planning, navigation, localization and SLAM) and arm robots (forward and inverse kinematics, Jacobians, dynamics and joint level control). "An authoritative book, reaching across fields, thoughtfully conceived and brilliantly accomplished!" Oussama Khatib, Stanford**

Modern Problems of Robotics

Second International Conference, MPoR 2020, Moscow, Russia, March 25–26, 2020, Revised Selected Papers

Springer Nature **This book constitutes the post-conference proceedings of the 2nd International Conference on Modern Problems of Robotics, MPoR 2020, held in Moscow, Russia, in March 2020. The 16 revised full papers were carefully reviewed and selected from 21 submissions. The volume includes the following topical sections: Collaborative Robotic Systems, Robotic Systems Design and Simulation, and Robots Control. The papers are devoted to the most interesting today's investigations in Robotics, such as the problems of the human–robot interaction, the problems of robot design and simulation, and the problems of robot and robotic complexes control.**

Springer Handbook of Robotics

Springer **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/**

Robotics, Vision and Control

Fundamental Algorithms In MATLAB® Second, Completely Revised, Extended And Updated Edition

Springer **Robotic vision, the combination of robotics and computer vision, involves the application of computer algorithms to data acquired from sensors. The research community has developed a large body of such algorithms but for a newcomer to the field this can be quite daunting. For over 20 years the author has maintained two open-source MATLAB® Toolboxes, one for robotics and one for vision. They provide implementations of many important algorithms and allow users to work with real problems, not just trivial examples. This book makes the fundamental algorithms of robotics, vision and control accessible to all. It weaves together theory, algorithms and examples in a narrative that covers robotics and computer vision separately and together. Using the latest versions of the Toolboxes the author shows how complex problems can be decomposed and solved using just a few simple lines of code. The topics covered are guided by real problems observed by the author over many years as a practitioner of both robotics and computer vision. It is written in an accessible but informative style, easy to read and absorb, and includes over 1000 MATLAB and Simulink® examples and over 400 figures. The book is a real walk through the fundamentals of mobile robots, arm robots. then camera models, image processing, feature extraction and multi-view geometry and finally bringing it all together with an extensive discussion of visual servo systems. This second edition is completely revised, updated and extended with coverage of Lie groups, matrix exponentials and twists; inertial navigation; differential drive robots; lattice planners; pose-graph SLAM and map making; restructured material on arm-robot kinematics and dynamics; series-elastic actuators and operational-space control; Lab color spaces; light field cameras; structured light, bundle adjustment and visual odometry; and photometric visual servoing. "An authoritative book, reaching across fields, thoughtfully conceived and brilliantly accomplished!" OUSSAMA KHATIB, Stanford**

Nature-Inspired Design of Hybrid Intelligent Systems

Springer **This book highlights recent advances in the design of hybrid intelligent systems based on nature-inspired optimization and their application in areas such as intelligent control and robotics, pattern recognition, time series prediction, and optimization of complex problems. The book is divided into seven main parts, the first of which addresses**

theoretical aspects of and new concepts and algorithms based on type-2 and intuitionistic fuzzy logic systems. The second part focuses on neural network theory, and explores the applications of neural networks in diverse areas, such as time series prediction and pattern recognition. The book's third part presents enhancements to meta-heuristics based on fuzzy logic techniques and describes new nature-inspired optimization algorithms that employ fuzzy dynamic adaptation of parameters, while the fourth part presents diverse applications of nature-inspired optimization algorithms. In turn, the fifth part investigates applications of fuzzy logic in diverse areas, such as time series prediction and pattern recognition. The sixth part examines new optimization algorithms and their applications. Lastly, the seventh part is dedicated to the design and application of different hybrid intelligent systems.

Path Planning and Control of Cooperative Mobile Robots Using Discrete Event Models

John Wiley & Sons **Offers an integrated presentation for path planning and motion control of cooperative mobile robots using discrete-event system principles Generating feasible paths or routes between a given starting position and a goal or target position—while avoiding obstacles—is a common issue for all mobile robots. This book formulates the problem of path planning of cooperative mobile robots by using the paradigm of discrete-event systems. It presents everything readers need to know about discrete event system models—mainly Finite State Automata (FSA) and Petri Nets (PN)—and methods for centralized path planning and control of teams of identical mobile robots. Path Planning of Cooperative Mobile Robots Using Discrete Event Models begins with a brief definition of the Path Planning and Motion Control problems and their state of the art. It then presents different types of discrete models such as FSA and PNs. The RMTool MATLAB toolbox is described thereafter, for readers who will need it to provide numerical experiments in the last section. The book also discusses cell decomposition approaches and shows how the divided environment can be translated into an FSA by assigning to each cell a discrete state, while the adjacent relation together with the robot's dynamics implies the discrete transitions. Highlighting the benefits of Boolean Logic, Linear Temporal Logic, cell decomposition, Finite State Automata modeling, and Petri Nets, this book also: Synthesizes automatic strategies based on Discrete Event Systems (DES) for path planning and motion control and offers software implementations for the involved algorithms Provides a tutorial for motion planning introductory courses or related simulation-based projects using a MATLAB package called RMTool (Robot Motion Toolbox) Includes simulations for problems solved by methodologies presented in the book Path Planning of Cooperative Mobile Robots Using Discrete Event Models is an ideal book for undergraduate and graduate students and college and university professors in the areas of robotics, artificial intelligence, systems modeling, and autonomous control.**

Mathematical Modelling, Nonlinear Control and Performance Evaluation of a Ground Based Mobile Air Defence System

Springer Nature **In this book, the author deals with the mathematical modelling, nonlinear control and performance evaluation of a conceptual anti-aircraft gun based mobile air defence system engaging an attacking three-dimensional aerial target. This book is of interest to academic faculty, graduate students and industry professionals working in the fields of mathematical modelling and control, ground vehicles, mobile air defence systems and other related topics.**

Robotics in Education

Methods and Applications for Teaching and Learning

Springer **This proceedings volume comprises the latest achievements in research and development in educational robotics presented at the 9th International Conference on Robotics in Education (RiE) held in Qawra, St. Paul's Bay, Malta, during April 18-20, 2018. Researchers and educators will find valuable methodologies and tools for robotics in education that encourage learning in the fields of science, technology, engineering, arts and mathematics (STEAM) through the design, creation and programming of tangible artifacts for creating personally meaningful objects and addressing real-world societal needs. This also involves the introduction of technologies ranging from robotics platforms to programming environments and languages. Extensive evaluation results are presented that highlight the impact of robotics on the students' interests and competence development. The**

presented approaches cover the whole educative range from elementary school to the university level in both formal as well as informal settings.

Cybernetics and Automation Control Theory Methods in Intelligent Algorithms

Proceedings of 8th Computer Science On-line Conference 2019, Vol. 3

Springer **This book discusses novel intelligent-system algorithms and methods in cybernetics, presenting new approaches in the field of cybernetics and automation control theory. It constitutes the proceedings of the Cybernetics and Automation Control Theory Methods in Intelligent Algorithms Section of the 8th Computer Science On-line Conference 2019 (CSOC 2019), held on-line in April 2019.**

Living Machines

A Handbook of Research in Biomimetics and Biohybrid Systems

Oxford University Press **Contemporary research in the field of robotics attempts to harness the versatility and sustainability of living organisms. By exploiting those natural principles, scientists hope to render a renewable, adaptable, and robust class of technology that can facilitate self-repairing, social, and moral--even conscious--machines. This is the realm of robotics that scientists call "the living machine." Living Machines can be divided into two entities-biomimetic systems, those that harness the principles discovered in nature and embody them in new artifacts, and biohybrid systems, which couple biological entities with synthetic ones. Living Machines: A handbook of research in biomimetic and biohybrid systems surveys this flourishing area of research. It captures the current state of play and points to the opportunities ahead, addressing such fields as self-organization and co-operativity, biologically-inspired active materials, self-assembly and self-repair, learning, memory, control architectures and self-regulation, locomotion in air, on land or in water, perception, cognition, control, and communication. In all of these areas, the potential of biomimetics is shown through the construction of a wide range of different biomimetic devices and animal-like robots. Biohybrid systems is a relatively new field, with exciting and largely unknown potential, but one that is likely to shape the future of humanity. Chapters outline current research in areas including brain-machine interfaces-where neurons are connected to microscopic sensors and actuators-and various forms of intelligent prostheses from sensory devices like artificial retinas, to life-like artificial limbs, brain implants, and virtual reality-based rehabilitation approaches. The handbook concludes by exploring the impact living machine technology will have on both society and the individual, by forcing human beings to question how we see and understand ourselves. With contributions from leading researchers drawing on ideas from science, engineering, and the humanities, this handbook will appeal to both undergraduate and postgraduate students of biomimetic and biohybrid technologies. Researchers in the areas of computational modeling and engineering, including artificial intelligence, machine learning, artificial life, biorobotics, neurorobotics, and human-machine interfaces, will find Living Machines an invaluable resource.**

Exploring an Unknown Graph by a Team of Robots Using Serendipity Rendezvous Algorithms

BoD – Books on Demand **Dependence on a team of robots to carry out the exploration missions has many benefits such as speeding up the missions; provided that the coordination among robots is maintained. Many circumstances limit the communication which is crucial for the coordination among robots (e.g. impenetrable barriers, high temperature etc.). A periodic rendezvous strategy is considered in this dissertation a work-around in order to overlap communication ranges of the robots. Attending these periodic rendezvous sessions requires that the robots interrupt their current exploration progress periodically and traverse back to the rendezvous points (i.e. Interruptibility). During their trips to these points, they do not gain new knowledge since they cross already explored parts of the area. Therefore, using rendezvous strategies improves the team behaviour but has a negative impact on the time efficiency. Serendipity Rendezvous – the contribution of this dissertation - invests the dedicated time of Interruptibility trip in the inter-coordination among the robots by finding a serendipity path. This path is where the robot, which runs Serendipity Rendezvous, meets its colleagues accidentally on its way to the rendezvous point. The evaluation**

results show that Serendipity Rendezvous is able to mitigate the negative impact of Interruptibility while maintaining its positive impacts. Moreover, it provides a balance utilization of robots for the exploration activities. These results are achieved without affecting the already scheduled rendezvous. Hence, Serendipity Rendezvous optimizes periodic rendezvous sessions as long as the margin of the gaining knowledge by meeting other robots on the serendipity path is considered rewarded for the robots which run Serendipity Rendezvous.

Learning for Adaptive and Reactive Robot Control

A Dynamical Systems Approach

MIT Press **Methods by which robots can learn control laws that enable real-time reactivity using dynamical systems; with applications and exercises. This book presents a wealth of machine learning techniques to make the control of robots more flexible and safe when interacting with humans. It introduces a set of control laws that enable reactivity using dynamical systems, a widely used method for solving motion-planning problems in robotics. These control approaches can replan in milliseconds to adapt to new environmental constraints and offer safe and compliant control of forces in contact. The techniques offer theoretical advantages, including convergence to a goal, non-penetration of obstacles, and passivity. The coverage of learning begins with low-level control parameters and progresses to higher-level competencies composed of combinations of skills. Learning for Adaptive and Reactive Robot Control is designed for graduate-level courses in robotics, with chapters that proceed from fundamentals to more advanced content. Techniques covered include learning from demonstration, optimization, and reinforcement learning, and using dynamical systems in learning control laws, trajectory planning, and methods for compliant and force control . Features for teaching in each chapter: • applications, which range from arm manipulators to whole-body control of humanoid robots; • pencil-and-paper and programming exercises; • lecture videos, slides, and MATLAB code examples available on the author's website . • an eTextbook platform website offering protected material[EPS2] for instructors including solutions.**

Computer Aided Systems Theory – EUROCAST 2005

10th International Conference on Computer Aided Systems Theory, Las Palmas de Gran Canaria, Spain, February 7-11, 2005, Revised Selected Papers

Springer **The concept of CAST, computer aided systems Theory, was introduced by F. Pichler of Linz in the late 1980s to include those computer theoretical and practical developments used as tools to solve problems in system science. It was considered as the third component (the other two being CAD and CAM) that would provide for a complete picture of the path from computer and systems sciences to practical developments in science and engineering. The University of Linz organized the first CAST workshop in April 1988, which demonstrated the acceptance of the concepts by the scientific and technical community. Next, the University of Las Palmas de Gran Canaria joined the University of Linz to organize the first international meeting on CAST (Las Palmas February 1989), under the name EUROCAST 1989, a very successful gathering of systems theorists, computer scientists and engineers from most European countries, North America and Japan. It was agreed that EUROCAST international conferences would be organized every two years. Thus, the following EUROCAST meetings took place in Krems (1991), Las Palmas (1993), Innsbruck (1995), Las Palmas (1997), Vienna (1999), Las Palmas (2001) and Las Palmas (2003) in addition to an extra-European CAST conference in Ottawa in 1994. Selected papers from those meetings were published as Springer Lecture Notes in Computer Science vols. 410, 585, 763, 1030, 1333, 1728, 2178 and 2809 and in several special issues of Cybernetics and Systems: an International Journal.**

Robotics for Sustainable Future

CLAWAR 2021

Springer Nature **This book presents the proceedings of 24th International Conference Series on Climbing and Walking Robots. CLAWAR 2021 is the twenty-fourth edition of International Conference series on Climbing and Walking Robots and the Support Technologies for Mobile Machines. The conference is organized by CLAWAR Association in collaboration with Kwansei Gakuin University on a virtual platform in Takarazuka, Japan, during 30 August–01 September 2021. CLAWAR 2021 brings new developments and new research findings in robotics technologies within the framework of "Robotics for Sustainable Future". The topics covered include biped locomotion, human–machine/human–robot interaction, innovative actuators, power supplies and design of CLAWAR, inspection, legged locomotion, modelling and simulation of CLAWAR, outdoor and field robotics, planning and control, and wearable devices and assistive robotics. The intended readership includes participants of CLAWAR 2021 conference, international robotic researchers, scientists, professors of related topics worldwide, and professors and students of postgraduate courses in Robotics and Automation, Control Engineering, Mechanical Engineering, and Mechatronics.**

Machine Vision and Navigation

Springer Nature **This book presents a variety of perspectives on vision-based applications. These contributions are focused on optoelectronic sensors, 3D & 2D machine vision technologies, robot navigation, control schemes, motion controllers, intelligent algorithms and vision systems. The authors focus on applications of unmanned aerial vehicles, autonomous and mobile robots, industrial inspection applications and structural health monitoring. Recent advanced research in measurement and others areas where 3D & 2D machine vision and machine control play an important role, as well as surveys and reviews about vision-based applications. These topics are of interest to readers from diverse areas, including electrical, electronics and computer engineering, technologists, students and non-specialist readers. • Presents current research in image and signal sensors, methods, and 3D & 2D technologies in vision-based theories and applications; • Discusses applications such as daily use devices including robotics, detection, tracking and stereoscopic vision systems, pose estimation, avoidance of objects, control and data exchange for navigation, and aerial imagery processing; • Includes research contributions in scientific, industrial, and civil applications.**

Field and Service Robotics

Results of the 9th International Conference

Springer **FSR, the International Conference on Field and Service Robotics, is a robotics Symposium which has established over the past ten years the latest research and practical results towards the use of field and service robotics in the community with particular focus on proven technology. The first meeting was held in Canberra, Australia, in 1997. Since then the meeting has been held every two years in the pattern Asia, America, Europe. Field robots are non-factory robots, typically mobile, that operate in complex and dynamic environments; on the ground (of earth or planets), under the ground, underwater, in the air or in space. Service robots are those that work closely with humans to help them with their lives. This book present the results of the ninth edition of Field and Service Robotics, FSR13, held in Brisbane, Australia on 9th-11th December 2013. The conference provided a forum for researchers, professionals and robot manufactures to exchange up-to-date technical knowledge and experience. This book offers a collection of a broad range of topics including: Underwater Robots and Systems, Unmanned Aerial Vehicles technologies and applications, Agriculture, Space, Search and Rescue and Domestic Robotics, Robotic Vision, Mapping and Recognition.**

Remote and Telerobotics

BoD – Books on Demand **Any book which presents works about controlling distant robotics entities, namely the field of telerobotics, will propose advanced technics concerning time delay compensation, error handling, autonomous systems, secured and complex distant manipulations, etc. So does this new book, Remote and Telerobotics, which presents such state-of-the-art advanced solutions, allowing for instance to develop an open low-cost Robotics platform or to use very efficient prediction models to compensate latency. This edition is organized around eleven high-level chapters, presenting international research works coming from Japan, Korea, France, Italy, Spain, Greece and Netherlands.**

Trends in Advanced Intelligent Control, Optimization and Automation

Proceedings of KKA 2017—The 19th Polish Control Conference, Kraków, Poland, June 18–21, 2017

Springer **This volume contains the proceedings of the KKA 2017 - the 19th Polish Control Conference, organized by the Department of Automatics and Biomedical Engineering, AGH University of Science and Technology in Kraków, Poland on June 18–21, 2017, under the auspices of the Committee on Automatic Control and Robotics of the Polish Academy of Sciences, and the Commission for Engineering Sciences of the Polish Academy of Arts and Sciences. Part 1 deals with general issues of modeling and control, notably flow modeling and control, sliding mode, predictive, dual, etc. control. In turn, Part 2 focuses on optimization, estimation and prediction for control. Part 3 is concerned with autonomous vehicles, while Part 4 addresses applications. Part 5 discusses computer methods in control, and Part 6 examines fractional order calculus in the modeling and control of dynamic systems. Part 7 focuses on modern robotics. Part 8 deals with modeling and identification, while Part 9 deals with problems related to security, fault detection and diagnostics. Part 10 explores intelligent systems in automatic control, and Part 11 discusses the use of control tools and techniques in biomedical engineering. Lastly, Part 12 considers engineering education and teaching with regard to automatic control and robotics.**

Soft Computing Applications

Proceedings of the 5th International Workshop Soft Computing Applications (SOFA)

Springer Science & Business Media **This volume contains the Proceedings of the 5thInternational Workshop on Soft Computing Applications (SOFA 2012). The book covers a broad spectrum of soft computing techniques, theoretical and practical applications employing knowledge and intelligence to find solutions for world industrial, economic and medical problems. The combination of such intelligent systems tools and a large number of applications introduce a need for a synergy of scientific and technological disciplines in order to show the great potential of Soft Computing in all domains. The conference papers included in these proceedings, published post conference, were grouped into the following area of research: · Soft Computing and Fusion Algorithms in Biometrics, · Fuzzy Theory, Control andApplications, · Modelling and Control Applications, · Steps towards Intelligent Circuits, · Knowledge-Based Technologies for Web Applications, Cloud Computing and Security Algorithms, · Computational Intelligence for Biomedical Applications, · Neural Networks and Applications, · Intelligent Systems for Image Processing, · Knowledge Management for Business Process and Enterprise Modelling. The combination of intelligent systems tools and a large number of applications introduce a need for a synergy of scientific and technological disciplines in order to show the great potential of Soft Computing in all domains.**

Visual Informatics: Bridging Research and Practice

First International Visual Informatics Conference, IVIC 2009 Kuala Lumpur, Malaysia, November 11-13, 2009 Proceedings

Springer **Visual informatics is a field of interest not just among the information technology and computer science community, but also other related fields such as engineering, me- cal and health informatics and education starting in the early 1990s. Recently, the field is gaining more attention from researchers and industry. It has become a mul- disciplinary and trans-disciplinary field related to research areas such as computer vision, visualization, information visualization, real-time image processing, medical image processing, image information retrieval, virtual reality, augmented reality, - pressive visual mathematics, 3D graphics, multimedia-fusion, visual data mining, visual ontology, as well as services and visual culture. Various efforts has been - vested in different research, but operationally, many of these systems are not pro- nent in the mass market and thus knowledge and research on these phenomena within the mentioned areas need to be shared and disseminated. It is for this reason that the Visual Informatics Research Group from Universiti - bangsaan Malaysia (UKM) decided to spearhead this initiative to bring together experts in this very diversified but important research area so that more concerted efforts can be undertaken not just within the visual informatics community in Malaysia but from other parts of the world, namely, Asia, Europe, Oceania, and USA. This first International Visual Informatics Conference (IVIC 2009) was conducted collaboratively, by the visual informatics research community from the various public and private institutions of higher learning in Malaysia, and hosted by UKM.**

Modern Robotics

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

Robust Control Design with MATLAB®

Springer Science & Business Media **Shows readers how to exploit the capabilities of the MATLAB® Robust Control and Control Systems Toolboxes to the fullest using practical robust control examples.**

Applications of Mobile Robots

BoD – Books on Demand **This book includes a selection of research work in the mobile robotics area, where several interesting topics are presented. In this way we find a review of multi-agents, different techniques applied to the navigation systems, artificial intelligence algorithms, which include deep learning applications, systems where a Kalman filter estimator is extended for visual odometry, and finally the design of an on-chip system for the execution of cognitive agents. Additionally, the development of different ideas in mobile robot applications are included and hopefully will be useful and enriching for readers.**

Smart Maintenance for Human–Robot Interaction

An Intelligent Search Algorithmic Perspective

Springer **This self-contained book, written by active researchers, presents up-to-date information on smart maintenance strategies for human–robot interaction (HRI) and the associated applications of novel search algorithms in a single volume, eliminating the need to consult scattered resources. Unlike other books, it addresses maintaining a smart HRI**

from three dimensions, namely, hardware, cyberware, and hybrid-asset management, covering problems encountered in each through a wide variety of representative examples and elaborated illustrations. Further, the diverse mathematical models and intelligent systems constructions make the book highly practical. It enables readers interested in maintenance, robotics, and intelligent systems but perplexed by myriads of interrelated issues to grasp basic methodologies. At the same time, the referenced literature can be used as a roadmap for conducting deeper researches.

Introduction to Autonomous Mobile Robots, second edition

MIT Press **The second edition of a comprehensive introduction to all aspects of mobile robotics, from algorithms to mechanisms. Mobile robots range from the Mars Pathfinder mission's teleoperated Sojourner to the cleaning robots in the Paris Metro. This text offers students and other interested readers an introduction to the fundamentals of mobile robotics, spanning the mechanical, motor, sensory, perceptual, and cognitive layers the field comprises. The text focuses on mobility itself, offering an overview of the mechanisms that allow a mobile robot to move through a real world environment to perform its tasks, including locomotion, sensing, localization, and motion planning. It synthesizes material from such fields as kinematics, control theory, signal analysis, computer vision, information theory, artificial intelligence, and probability theory. The book presents the techniques and technology that enable mobility in a series of interacting modules. Each chapter treats a different aspect of mobility, as the book moves from low-level to high-level details. It covers all aspects of mobile robotics, including software and hardware design considerations, related technologies, and algorithmic techniques. This second edition has been revised and updated throughout, with 130 pages of new material on such topics as locomotion, perception, localization, and planning and navigation. Problem sets have been added at the end of each chapter. Bringing together all aspects of mobile robotics into one volume, Introduction to Autonomous Mobile Robots can serve as a textbook or a working tool for beginning practitioners. Curriculum developed by Dr. Robert King, Colorado School of Mines, and Dr. James Conrad, University of North Carolina-Charlotte, to accompany the National Instruments LabVIEW Robotics Starter Kit, are available. Included are 13 (6 by Dr. King and 7 by Dr. Conrad) laboratory exercises for using the LabVIEW Robotics Starter Kit to teach mobile robotics concepts.**

Connectionist Models of Neurocognition and Emergent Behavior

From Theory to Applications - Proceedings of the 12Th Neural Computation and Psychology Workshop

World Scientific **This volume collects together most of the papers presented at the Twelfth Neural Computation and Psychology Workshop (NCPW12) held in 2010 at Birkbeck College (England). The conference invited submissions on neurocomputational models of all cognitive and psychological processes. The special theme of this conference was OC From Theory to ApplicationsOCO, which allowed submissions of pure theoretical work and of pure applied work. This topic extended the boundaries of the conference and highlighted the extent to which computational models of cognition and models in general are integrated in the cognitive sciences. The chapters in this book cover a wide range of research topics in neural computation and psychology, including cognitive development, language processing, higher-level cognition, but also ecology-based modeling of cognition, philosophy of science, and real-world applications."**

Advances in Autonomous Robotics Systems

15th Annual Conference, TAROS 2014, Birmingham, UK, September 1-3, 2014.

Proceedings

Springer **This book constitutes the refereed proceedings of the 15th Conference on Advances in Autonomous Robotics, TAROS 2014, held in Birmingham, UK, in September 2014. The 23 revised full papers presented together with 9 extended abstracts were carefully reviewed and selected from 48 submissions. The overall program covers various aspects of robotics, including navigation, planning, sensing and perception, flying and swarm robots, ethics, humanoid robotics, human-robot interaction, and social robotics.**

Proceedings of the Future Technologies Conference (FTC) 2018

Volume 1

Springer **The book, presenting the proceedings of the 2018 Future Technologies Conference (FTC 2018), is a remarkable collection of chapters covering a wide range of topics, including, but not limited to computing, electronics, artificial intelligence, robotics, security and communications and their real-world applications. The conference attracted a total of 503 submissions from pioneering researchers, scientists, industrial engineers, and students from all over the world. After a double-blind peer review process, 173 submissions (including 6 poster papers) have been selected to be included in these proceedings. FTC 2018 successfully brought together technology geniuses in one venue to not only present breakthrough research in future technologies but to also promote practicality and applications and an intra- and inter-field exchange of ideas. In the future, computing technologies will play a very important role in the convergence of computing, communication, and all other computational sciences and applications. And as a result it will also influence the future of science, engineering, industry, business, law, politics, culture, and medicine. Providing state-of-the-art intelligent methods and techniques for solving real-world problems, as well as a vision of the future research, this book is a valuable resource for all those interested in this area.**

ICCCE 2021

Proceedings of the 4th International Conference on Communications and Cyber Physical Engineering

Springer Nature **This book is a collection of research articles presented at the 4th International Conference on Communications and Cyber-Physical Engineering (ICCCE 2021), held on April 9 and 10, 2021, at CMR Engineering College, Hyderabad, India. ICCCE is one of the most prestigious conferences conceptualized in the field of networking and communication technology offering in-depth information on the latest developments in voice, data, image, and multimedia. Discussing the latest developments in voice and data communication engineering, cyber-physical systems, network science, communication software, image, and multimedia processing research and applications, as well as communication technologies and other related technologies, it includes contributions from both academia and industry. This book is a valuable resource for scientists, research scholars, and PG students working to formulate their research ideas and find the future directions in these areas. Further, it may serve as a reference work to understand the latest engineering and technologies used by practicing engineers in the field of communication engineering.**

Soft Computing and its Engineering Applications

Second International Conference, icSoftComp 2020, Changa, Anand, India, December 11–12, 2020, Proceedings

Springer Nature **This book constitutes the refereed proceedings of the Second International Conference on Soft Computing and its Engineering Applications, icSoftComp 2020, held in Changa, India, in December 2020. Due to the COVID-19 pandemic the conference was held online. The 24 full papers and 4 short papers presented were carefully reviewed and selected from 252 submissions. The papers present recent research on theory and applications in fuzzy computing, neuro computing, and evolutionary computing.**

Robotics and Mechatronics

Proceedings of the Fifth IFToMM International Symposium on Robotics & Mechatronics (ISRM 2017)

Springer **This book gathers the proceedings of the ISRM 2017, the fifth IFToMM International Symposium on Robotics and Mechatronics, which was jointly organised by the School of Computing, Engineering and Mathematics at Western Sydney University, Australia and by the IFToMM Technical Committee on Robotics and Mechatronics. The respective contributions showcase the latest advances, trends and future challenges in Computer Modelling and Simulation, Kinematics and Dynamics of Multi-Body Systems, Advanced Dynamics and Control Methods, Linkages and Mechanical Controls, Parallel Manipulators, Mechanism Design, Sensors and Actuators, Mobile Robotics: Navigation and Motion Planning, Bio-inspired Robotics, Micro/Nano-Robotics and Complex Robotic Systems.**

Programming for Computations - MATLAB/Octave

A Gentle Introduction to Numerical Simulations with MATLAB/Octave

Springer **This book presents computer programming as a key method for solving mathematical problems. There are two versions of the book, one for MATLAB and one for Python. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows the students to write simple programs for solving common mathematical problems with numerical methods in engineering and science courses. The emphasis is on generic algorithms, clean design of programs, use of functions, and automatic tests for verification.**

Advances in Asset Management and Condition Monitoring

COMADEM 2019

Springer Nature **This book gathers select contributions from the 32nd International Congress and Exhibition on Condition Monitoring and Diagnostic Engineering Management (COMADEM 2019), held at the University of Huddersfield, UK in September 2019, and jointly organized by the University of Huddersfield and COMADEM International. The aim of the Congress was to promote awareness of the rapidly emerging interdisciplinary areas of condition monitoring and diagnostic engineering management. The contents discuss the latest tools and techniques in the multidisciplinary field of performance monitoring, root cause failure modes analysis, failure diagnosis, prognosis, and proactive management of**

industrial systems. There is a special focus on digitally enabled asset management and covers several topics such as condition monitoring, maintenance, structural health monitoring, non-destructive testing and other allied areas. Bringing together expert contributions from academia and industry, this book will be a valuable resource for those interested in latest condition monitoring and asset management techniques.

Safety, Reliability, Risk and Life-Cycle Performance of Structures and Infrastructures

CRC Press **Safety, Reliability, Risk and Life-Cycle Performance of Structures and Infrastructures contains the plenary lectures and papers presented at the 11th International Conference on STRUCTURAL SAFETY AND RELIABILITY (ICOSSAR2013, New York, NY, USA, 16-20 June 2013), and covers major aspects of safety, reliability, risk and life-cycle performance of str**

Progress in Automation, Robotics and Measuring Techniques

Volume 2 Robotics

Springer **This book presents recent progresses in control, automation, robotics and measuring techniques. It includes contributions of top experts in the fields, focused on both theory and industrial practice. The particular chapters present a deep analysis of a specific technical problem which is in general followed by a numerical analysis and simulation and results of an implementation for the solution of a real world problem. The presented theoretical results, practical solutions and guidelines will be useful for both researchers working in the area of engineering sciences and for practitioners solving industrial problems.**

Visual Informatics: Bridging Research and Practice

First International Visual Informatics Conference, IVIC 2009 Kuala Lumpur, Malaysia, November 11-13, 2009 Proceedings

Springer Science & Business Media **This book constitutes the refereed proceedings of the First International Visual Informatics Conference, IVIC 2009, held in Kuala Lumpur, Malaysia, in November 2009. The 82 revised research papers presented together with four invited keynote papers were carefully reviewed and selected from 216 submissions. The papers are organized in topical sections on virtual technologies and systems, virtual environment, visualization, engineering and simulation, as well as visual culture, services and society.**

Cutting Edge Robotics 2010

BoD – Books on Demand **Robotics research, especially mobile robotics is a young field. Its roots include many engineering and scientific disciplines from mechanical, electrical and electronics engineering to computer, cognitive and social sciences. Each of this parent fields is exciting in its own way and has its share in different books. This book is a result of inspirations and contributions from many researchers worldwide. It presents a collection of a wide range of research results in robotics scientific community. We hope you will enjoy reading the book as much as we have enjoyed bringing it together for you.**

Anticipatory Behavior in Adaptive Learning Systems

Foundations, Theories, and Systems

Springer **The interdisciplinary topic of anticipation, attracting attention fromnbsp;computer scientists, psychologists, philosophers, neuroscientists, and biologists is a rather new and often misunderstood matter of research. This book attempts to establish anticipation as a research topic and encourage further research and development work. First, the book presents philosophical thoughts and concepts to stimulate the reader's concern about the topic. Fundamental cognitive psychology experiments then confirm the existence of anticipatory behavior in animals and humans and outline a first framework of anticipatory learning and behavior. Next, several distinctions and frameworks of anticipatory processes are discussed, including first implementations of these concepts. Finally, several anticipatory systems and studies on anticipatory behavior are presented.**