Advanced Control Of Wheeled Inverted Pendulum Systems

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Information Systems Design and Intelligent Applications Vikrant Bhateja 2018-03-01 The book is a collection of high-quality peer-reviewed research papers presented at International Conference on Information System Design and Intelligent Applications (INDIA 2017) held at Duy Tan University, Da Nang, Vietnam during 15-17 June 2017. The book covers a wide range of topics of computer science and information technology discipline ranging from image processing, database application, data mining, grid and cloud computing, bioinformatics and many others. The various intelligent tools like swarm intelligence, artificial intelligence, evolutionary algorithms, bio-inspired algorithms have been well applied in different domains for solving various challenging problems.

Robust Control Design with MATLAB® Da-Wei Gu 2014-07-08 Robust Control Design with MATLAB® (second edition) helps the student to learn how to use well-developed advanced robust control design methods in practical cases. To this end, several realistic control design examples from teaching-laboratory experiments, such as a two-wheeled, self-balancing robot, to complex systems like a flexible-link manipulator are given detailed presentation. All of these exercises are conducted using MATLAB® Robust Control Toolbox 3, Control System Toolbox and Simulink®. By sharing their experiences in industrial cases with minimum recourse to complicated theories and formulae, the authors convey essential ideas and useful insights into robust industrial control systems design using major H-infinity optimization and related methods allowing readers quickly to move on with their own challenges. The hands-on tutorial style of this text rests on an abundance of examples and features for the second edition: • rewritten and simplified presentation of theoretical and methodological material including original coverage of linear matrix inequalities; • new Part II forming a tutorial on Robust Control Toolbox 3; • fresh design problems including the control of a two-rotor dynamic system; and • end-of-chapter exercises. Electronic supplements to the written text that can be downloaded from extras.springer.com/isbn include: • M-files developed with MATLAB® help in understanding the essence of robust control system design portrayed in text-based examples; • MDL-files for simulation of open- and closed-loop systems in Simulink®; and • a solutions manual available free of charge to those adopting Robust Control Design with MATLAB® as a textbook for courses. Robust Control Design with MATLAB® is for graduate students and practising engineers who want to learn how to deal with robust control design problems without spending a lot of time in researching complex theoretical developments.

Advanced Mechanical Science and Technology for the Industrial Revolution 4.0 Ligang Yao 2017-10-30 This book includes more than 30 papers from the first FZU-OPU-NTOU Joint Symposium on Advanced Mechanical Science and Technology for the Industrial Revolution 4.0, held at Fuzhou University, China, in December 2016. The symposium was organized by Fuzhou University (FZU), Osaka Prefecture University (OPU) and National Taiwan Ocean University (NTOU). The authors include several professors from universities in China, Japan, and Taiwan as well as four distinguished invited professors from Canada, Korea, Japan, and Taiwan. The book covers all important aspects related to the 4.0 industrial revolution: robotics and mechatronics; sensors, measurements, and instrumentation; mechanical dynamics and controls; mechanical design; vehicle systems and technologies; fluid mechanics; monitoring and diagnosis, prognosis, and health management; advanced signal processing; and big data; all of which are subjects with great potential in the field of mechanical engineering.

Recent Trends in Information and Communication Technology Faisal Saeed 2017-05-24 This book presents 94 papers from the 2nd International Conference of Reliable Information and Communication Technology 2017 (IRICT 2017), held in Johor, Malaysia, on April 23–24, 2017. Focusing on the latest ICT innovations for data engineering, the book presents several hot research topics, including advances in big data analysis techniques and applications; mobile networks; applications and usability; reliable communication systems; advances in computer vision, artificial intelligence and soft computing; reliable health informatics and cloud computing environments, e-learning acceptance models, recent trends in knowledge management and software engineering; security issues in the cyber world; as well as society and information technology.

Advanced Control Design with Application to Electromechanical Systems Magdi S Mahmoud 2018-04-12 Advanced Control Design with Application to Electromechanical Systems represents the continuing effort in the pursuit of analytic theory and rigorous design for robust control methods. The book provides an overview of the feedback control systems and their associated definitions, with discussions on finite dimension vector spaces, mappings and convex analysis. In addition, a comprehensive treatment of continuous control system design is presented, along with an introduction to control design topics pertaining to discrete-time systems. Other sections introduces linear H1 and H2 theory, dissipativity analysis and synthesis, and a wide spectrum of models pertaining to electromechanical systems. Finally, the book examines the theory and mathematical analysis of multiagent systems. Researchers on robust control theory and electromechanical systems and graduate students working on robust control will benefit greatly from this book. Introduces a coherent and unified framework for studying robust control theory Provides the control-theoretic background required to read and contribute to the research literature Presents the main ideas and demonstrations of the major results of robust control theory Includes MATLAB codes to implement during research

Motion Control of Underactuated Mechanical Systems Javier Moreno-Valenzuela 2017-07-11 This volume is the first to present a unified perspective on the control of underactuated mechanical systems. Based on real-time implementation of parameter identification, this book provides a variety of algorithms for the Furuta pendulum and the inertia wheel pendulum, which are two-degrees-of-freedom mechanical systems. Specifically, this work addresses and solves the problem of motion control via trajectory tracking in one joint coordinate while another joint is regulated. Besides, discussions on extensions to higher degrees-of-freedom systems are given. The book, aimed at control engineers as well as graduate students, ranges from the problem of parameter identification of the studied systems to the practical implementation of sophisticated motion control algorithms. Offering real-world solutions to manage the control of underactuated systems, this book provides a concise tutorial on recent breakthroughs in the field, original procedures to achieve bounding of the error trajectories, convergence and gain tuning guidelines.

Handbook of Research on Modeling, Analysis, and Control of Complex Systems Azar, Ahmad Taher 2020-12-05 The current literature on dynamic systems is quite comprehensive, and system theory's mathematical jargon can remain quite complicated. Thus, there is a need for a compendium of accessible research that involves the broad range of fields that dynamic systems can cover, including engineering, life sciences, and the environment, and which can connect researchers in these fields. The Handbook of Research on Modeling, Analysis, and Control of Complex Systems is a comprehensive reference book that describes the recent developments in a wide range of areas including the modeling, analysis, and control of dynamic systems, as well as explores related applications. The book acts as a forum for researchers seeking to understand the latest theory findings and software problem experiments. Covering topics that include chaotic maps, predictive modeling, random bit generation, and software bug prediction, this book is ideal for professionals, academicians, researchers, and students in the fields of electrical engineering, computer science, control engineering, robotics, power systems, and biomedical engineering.

Advances in Soft Computing Ildar Batyrshin 2021-11-21 The two-volume set LNAI 13067 and 13068 constitutes the proceedings of the 20th Mexican International Conference on Artificial Intelligence, MICAI 2021, held in Mexico City, Mexico, in October 2021. The total of 58 papers presented in these two volumes was carefully reviewed and selected from 129 submissions. The first volume, Advances in Computational Intelligence, contains 30 papers structured into three sections: – Machine and Deep Learning – Image Processing and Pattern Recognition – Evolutionary and Metaheuristic Algorithms The second volume, Advances in Soft Computing, contains 28 papers structured into two sections: – Natural Language Processing – Intelligent Applications and Robotics

Intelligent Robotics and Applications Honghai Liu 2015-08-19 This three volume set LNAI 9244, 9245, and 9246 constitutes the refereed proceedings of the 8th International Conference on Intelligent Robotics and Applications, ICIRA 2015, held in Portsmouth, UK, in August 2015. The 61 papers included in the second volume are organized in topical sections on man-machine interaction; robot design, development and control; navigation and planning; robot motion analysis and planning; medical robot; prototyping; and manufacturing.

Fuzzy Systems: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources 2017-02-22 There are a myriad of mathematical problems that cannot be solved using traditional methods. The development of fuzzy expert systems has provided new opportunities for problem-solving amidst uncertainties. Fuzzy Systems: Concepts, Methodologies, Tools, and Applications is a comprehensive reference source on the latest scholarly research and developments in fuzzy rule-based methods and examines both theoretical foundations and real-world utilization of these logic sets. Featuring a range of extensive coverage across innovative topics, such as fuzzy logic, rule-based systems, and fuzzy analysis, this is an essential publication for scientists, doctors, engineers, physicians, and researchers interested in emerging perspectives and uses of fuzzy systems in various sectors.

Adaptive Mobile Robotics Abul K. M. Azad 2012 This book provides state-of-the-art scientific and engineering research findings and developments in the area of mobile robotics and associated support technologies. The book contains peer reviewed articles presented at the CLAWAR 2012 conference. Robots are no longer confined to industrial and manufacturing environments. A great deal of interest is invested in the use of robots outside the factory environment. The CLAWAR conference series, established as a high profile international event, acts as a platform for dissemination of research and development findings and supports such a trend to address the current interest in mobile robotics to meet the needs of mankind in various sectors of the society. These include personal care, public health, services in the domestic, public and industrial environments. The editors of the book have extensive research experience and publications in the area of robotics in general and in mobile robotics specifically, and their experience is reflected in editing the contents of the book.

Advanced Control of Wheeled Inverted Pendulum Systems Zhijun Li 2012-07-13 Advanced Control of Wheeled Inverted Pendulum Systems is an orderly presentation of recent ideas for overcoming the complications inherent in the control of wheeled inverted pendulum (WIP) systems, in the presence of uncertain dynamics, nonholonomic kinematic constraints as well as underactuated configurations. The text leads the reader in a theoretical exploration of problems in kinematics, dynamics modeling, advanced control design techniques and trajectory generation for WIPs. An important concern is how to deal with various uncertainties associated with the nominal model, WIPs being characterized by unstable balance and unmodelled dynamics and being subject to time-varying external disturbances for which accurate models are hard to come by. The book is self-contained, supplying the reader with everything from mathematical preliminaries and the basic Lagrange-Euler-based derivation of dynamics equations to various advanced motion control and force control approaches as well as trajectory generation method. Although primarily intended for researchers in robotic control, Advanced Control of Wheeled Inverted Pendulum Systems will also be useful reading for graduate students studying nonlinear systems more generally.

Soft Computing in Advanced Robotics Yong-Tae Kim 2014-07-08 Intelligent system and robotics are inevitably bound up; intelligent robots makes embodiment of system integration by using the intelligent systems. We can figure out that intelligent systems are to cell units, while intelligent robots are to body components. The two technologies have been synchronized in progress. Making leverage of the robotics and intelligent systems, applications cover boundlessly the range from our daily life to space station; manufacturing, healthcare, environment, energy, education, personal assistance, logistics. This book aims at presenting the research results in relevance with intelligent robotics technology. We propose to researchers and practitioners some methods to advance the intelligent systems and apply them to advanced robotics technology. This book consists of 10 contributions that feature mobile robots, robot emotion, electric power steering, multi-agent, fuzzy visual navigation, adaptive network-based fuzzy inference system, swarm EKF localization and inspection robot. This edition is published in original, peer reviewed contributions covering from initial design to final prototypes and authorization.

TheInverted Pendulum in Control Theory and Robotics Olfa Boubaker 2017-10 This book provides an overall picture of historical and current trends and developments in nonlinear control theory, based on the simple structure and rich nonlinear model of the inverted pendulum.

International Advanced Researches & Engineering Congress 2017 Proceeding Book Recep HALICIOGLU 2017-12-29 INTERNATIONAL WORKSHOPS (at IAREC'17) (This book inclueds English (main) and Turkish languages) International Workshop on Mechanical Engineering International Workshop on Mechatronics Engineering International Workshop on Energy Systems Engineering International Workshop on Automotive Engineering and Aerospace Engineering International Workshop on Material Engineering International Workshop on Manufacturing Engineering International Workshop on Physics Engineering International Workshop on Electrical and Electronics Engineering International Workshop on Computer Engineering and Software Engineering International Workshop on Chemical Engineering International Workshop on Textile Engineering International Workshop on Architecture International Workshop on Civil Engineering International Workshop on Geomatics Engineering International Workshop on Industrial Engineering International Workshop on Food Engineering International Workshop on Aquaculture Engineering International Workshop on Agriculture Engineering International Workshop on Mathematics Engineering International Workshop on Bioengineering Engineering International Workshop on Biomedical Engineering International Workshop on Genetic Engineering International Workshop on Environmental Engineering International Workshop on Other Engineering Science

Advanced Knowledge Application in Practice Igor Fuerstner 2010-11-02 The integration and interdependency of the world economy leads towards the creation of a global market that offers more opportunities, but is also more complex and competitive than ever before. Therefore widespread research activity is necessary if one is to remain successful on the market. This book is the result of research and development activities from a number of researchers worldwide, covering concrete fields of research.

Robotic Manipulators and Vehicles Gerasimos Rigatos 2018-05-24 This monograph addresses problems of: • nonlinear control, estimation and filtering for robotic manipulators (multi-degree-of freedom rigid-link robots, flexible-link robots, underactuated, redundant and cooperating manipulators and closed-chain robotic mechanisms); and• nonlinear control, estimation and filtering for autonomous robotic vehicles operating on the ground, in the air, and on and under water, independently and in cooperating groups. The book is a thorough treatment of the entire range of applications of robotic manipulators and autonomous vehicles. The nonlinear control and estimation methods it develops can be used generically, being suitable for a wide range of robotic systems. Such methods can improve robustness, precision and fault-tolerance in robotic manipulators and vehicles at the same time as enabling the reliable functioning of these systems under variable conditions, model uncertainty and external perturbations.

Proceedings of the 10th National Technical Seminar on Underwater System Technology 2018 Zainah Md Zain 2019-02-08 This book presents cutting-edge research papers in the field of Underwater System Technology in Malaysia and Asia in general. The topics covered include intelligent robotics, novel sensor technologies, control algorithms, acoustic signal processing, imaging techniques, biomimetic robots, green energy sources, and underwater communication backbones and protocols. The book showcases some of the latest technologies and applications developed to facilitate local marine exploration and exploitation. It also addresses related topics concerning the Sustainable Development Goals (SDG) outlined by the United Nations.

Automation 2021: Recent Achievements in Automation, Robotics and Measurement Techniques Roman Szewczyk 2021-04-29 This book contains 38 papers authored by both scientists and practitioners focused on an interdisciplinary approach to the development of cyber-physical systems. Recently our civilization has been facing one of the most severe challenges in modern history. The COVID-19 pandemic devastated the global economy and significantly disrupted numerous areas of economic activity. Only radical increase of efficiency and versatility of industrial production, with further limitation of human involvement, paralleled by the decrease of environmental burden, will enable us to cope with such challenges. We hope that the presented book provides input to the solution of at least some problems brought about by this challenge. This approach relies on the development of measuring techniques, robotic and mechatronic systems, industrial automation, numerical modeling and simulation as well as application of artificial intelligence techniques required by the transformation leading to Industry 4.0.

Foundations and Applications of Intelligent Systems Fuchun Sun 2013-11-22 These proceedings present technical papers selected from the 2012 International Conference on Intelligent Systems and Knowledge Engineering (ISKE 2012), held on December 15-17 in Beijing. The aim of this conference is to bring together experts from different fields of expertise to discuss the state-of-the-art in Intelligent Systems and Knowledge Engineering, and to present new findings and perspectives on future developments. The proceedings introduce current scientific and technical advances in the fields of artificial intelligence, machine learning, pattern recognition, data mining, knowledge engineering, information retrieval, information theory, knowledge-based systems, knowledge representation and reasoning, multi-agent systems, and natural-language processing, etc. Furthermore they include papers on new intelligent computing paradigms, which combine new computing methodologies, e.g., cloud computing, service computing and pervasive computing with traditional intelligent methods. By presenting new methodologies and practices, the proceedings will benefit both researchers and practitioners who want to utilize intelligent methods in their specific fields. Dr. Fuchun Sun is a professor at the Department of Computer Science & Technology, Tsinghua University, China. Dr. Tianrui Li is a professor at the School of Information Science & Technology, Southwest Jiaotong University, Chengdu, China. Dr. Hongbo Li also works at the Department of Computer Science & Technology, Tsinghua University, China.

Proceedings of the International Conference on Advanced Intelligent Systems and Informatics 2018 Aboul Ella Hassanien 2018-08-28 This book presents the proceedings of the 4th International Conference on Advanced Intelligent Systems and Informatics 2018 (AISI2018), which took place in Cairo, Egypt from September 1 to 3, 2018. This international and interdisciplinary conference, which highlighted essential research and developments in the field of informatics and intelligent systems, was organized by the Scientific Research Group in Egypt (SRGE). The book is divided into several main sections: Intelligent Systems; Robot Modeling and Control Systems; Intelligent Robotics Systems; Machine Learning Methodology and Applications; Sentiment Analysis and Arabic Text Mining; Swarm Optimizations and Applications; Deep Learning and Cloud Computing; Information Security, Hiding, and Biometric Recognition; and Data Mining, Visualization and E-learning.

Advances in Applied Nonlinear Optimal Control Gerasimos Rigatos 2020-11-19 This volume discusses advances in applied nonlinear optimal control, comprising both theoretical analysis of the developed control methods and case studies about their use in robotics, mechatronics, electric power generation, power electronics, micro-electronics, biological systems, biomedical systems, financial systems and industrial production processes. The advantages of the nonlinear optimal control approaches which are developed here are that, by applying approximate linearization of the controlled systems' state-space description, one can avoid the elaborated state variables transformations (diffeomorphisms) which are required by global linearization-based control methods. The book also applies the control input directly to the power unit of the controlled systems and not on an equivalent linearized description, thus avoiding the inverse transformations met in global linearization-based control methods and the potential appearance of singularity problems. The method adopted here also retains the known advantages of optimal control, that is, the best trade-off between accurate tracking of reference setpoints and moderate variations of the control inputs. The book's findings on nonlinear optimal control are a substantial contribution to the areas of nonlinear control and complex dynamical systems, and will find use in several research and engineering disciplines and in practical applications.

A K M Azad 2012-07-11 This book provides state-of-the-art scientific and engineering research findings and developments in the area of mobile robotics and associated support technologies. The book contains peer reviewed articles presented at the CLAWAR 2012 conference. Robots are no longer confined to industrial manufacturing environments. A great deal of interest is invested in the use of robots outside the factory environment. The CLAWAR conference series, established as a high profile international event, acts as a platform for dissemination of research and development findings and supports such a trend to address the current interest in mobile robotics to meet the needs of mankind in various sectors of the society. These include personal care, public health, services in the domestic, public and industrial environments. The editors of the book have extensive research experience and publications in the area of robotics in general and in mobile robotics specifically, and their experience is reflected in editing the contents of the book. Contents:Plenary PresentationsAssistive RobotsAutonomous RobotsBiologically-Inspired Systems and SolutionsInnovative Design of CLAWARLocomotionMiscellaneous ApplicationsModelling and Simulation of CLAWARPerception and Sensor FusionPlanning and ControlService RobotsService Robot Standards and Standardization Readership: Systems and control engineers, electrical engineers, mechanical engineers in academic, research and industrial settings. Engineers and practitioners in the public services sectors in health care, manufacturing, supply and delivery services. Keywords:Biologically Inspired Robotics;Biomedical Robotics;Climbing and Walking Robots;Humanoid Robotics;Hybrid Locomotion;Legged Locomotion;Mobile Robots;Robotic Benchmarking and Standardization;Security and Surveillance;Service Robotics;Wheeled Locomotion

Fuzzy Adaptive Control of a Two-wheeled Inverted Pendulum Tianqi Xi 2018 Recently, the two-wheeled inverted pendulum has drawn the attention of robotic community in view of a plethora of applications, such as transport vehicles: Segway, teleconferencing robots, and electronic network-vehicle. As a widely-used personal transportation vehicle, a two-wheeled inverted pendulum robot has the advantages of small size and simple structure. Moreover, with the advent of modern control technology, these kinds of platforms with safety features and sophisticated control functions can be cost down, so that they have high potential to satisfy stringent requirements of various autonomous service robots with high speed. At the same time, it is of great interest from control point of view as the inverted pendulum is a complicated, strongly coupled, unstable and nonlinear system. Therefore, it is an ideal experimental platform for various control theories and experiments. To understand such a complex system, the Lagrangian equation has been introduced to develop a dynamic model. And following the mathematical model, linear quadratic regulator control and fuzzy adaptive method are proposed for upright stabilization, velocity control and position control of the system. However, sometimes these kinds of robots need to move on a slope, so an advanced linear quadratic regulator controller and a modified fuzzy adaptive controller have been proposed to achieve position control on a slope for the robot while stabilizing its body in balance. In addition, trajectory tracking control using proportional integral derivative control and sliding mode control with fuzzy adaptive backstepping method is also designed to make the robot autonomously navigate in two dimensional plane. Simulation results indicate that the proposed controllers are capable of providing appropriate control actions to steer the vehicle in desired manners. Then, a couple of real time experiments have been conducted to verify the the effectiveness of the developed control strategies.

Advances in Neural Networks- ISNN 2013 Chengan Guo 2013-07-04 The two-volume set LNCS 7951 and 7952 constitutes the refereed proceedings of the 10th International Symposium on Neural Networks, ISNN 2013, held in Dalian, China, in July 2013. The 157 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers are organized in following topics: computational neuroscience, cognitive science, neural network models, learning algorithms, stability and convergence analysis, kernel methods, large margin methods and SVM, optimization algorithms, varational methods, control, robotics, bioinformatics and biomedical engineering, brain-like systems and brain-computer interfaces, data mining and knowledge discovery and other applications of neural networks.

Lin Zhang 2016-09-21 This four-volume set (CCIS 643, 644, 645, 646) constitutes the refereed proceedings of the 16th Asia Simulation Conference and the First Autumn Simulation Multi-Conference, AsiaSim / SCS AutumnSim 2016, held in Beijing, China, in October 2016. The 265 revised full papers presented were carefully reviewed and selected from 651 submissions. The papers in this third volume of the set are organized in topical sections on Cloud technologies in simulation applications; fractional calculus with applications and simulations; modeling and simulation for energy, environment and climate; SBA virtual prototyping engineering technology; simulation and Big Data.

Advanced Control Engineering Roland Burns 2001-11-21 Advanced Control Engineering provides a complete course in control engineering for undergraduates of all technical disciplines. Included are real-life case studies, numerous problems, and accompanying MatLab programs.

The Reaction Wheel Pendulum Daniel Jerome Block 2007 This monograph is concerned with modeling and control of a novel inverted pendulum device known as the Reaction Wheel Pendulum. The Reaction Wheel Pendulum is perhaps the simplest of the various pendulum systems in terms of its dynamic properties. At the same time, the Reaction Wheel Pendulum exhibits several properties, such as underactuation and nonlinearity that make it an attractive and useful system for research and advanced education. As such, the Reaction Wheel Pendulum is ideally suited for educating engineering students at virtually every level, from freshman to advanced graduate students.

Advanced Robotics and Intelligent Automation in Manufacturing Habib, Maki K. 2019-11-15 While human capabilities can withstand broad levels of strain, they cannot hope to compete with the advanced abilities of automated technologies. Developing advanced robotic systems will provide a better, faster means to produce goods and deliver a level of seamless communication and synchronization that exceeds human skill. Advanced Robotics and Intelligent Automation in Manufacturing is a pivotal reference source that provides vital research on the application of advanced manufacturing technologies in regards to production speed, quality, and innovation. While highlighting topics such as human-machine interaction, quality management, and sensor integration, this publication explores state-of-the-art technologies in the field of robotics engineering as well as human-robot interaction. This book is ideally designed for researchers, students, engineers, manufacturers, managers, industry professionals, and academicians seeking to enhance their innovative design capabilities.

13th Chaotic Modeling and Simulation International Conference Christos H. Skiadas 2021 Gathering the proceedings of the 13th CHAOS2020 International Conference, this book highlights recent developments in nonlinear, dynamical and complex systems. The conference was intended to provide an essential forum for Scientists and Engineers to exchange ideas, methods, and techniques in the field of Nonlinear Dynamics, Chaos, Fractals and their applications in General Science and the Engineering Sciences. The respective chapters address key methods, empirical data and computer techniques, as well as major theoretical advances in the applied nonlinear field. Beyond showcasing the state of the art, the book will help academic and industrial researchers alike apply chaotic theory in their studies. .

Computational Science and Its Applications – ICCSA 2018 Osvaldo Gervasi 2018-07-03 The five volume set LNCS 10960 until 10964 constitutes the refereed proceedings of the 18th International Conference on Computational Science and Its Applications, ICCSA 2018, held in Melbourne, Australia, in July 2018. Apart from the general tracks, ICCSA 2018 also includes 34 international workshops in various areas of computational sciences, ranging from computational science technologies, to specific areas of computational sciences, such as computer graphics and virtual reality. The total of 265 full papers and 10 short papers presented in the 5-volume proceedings set of ICCSA 2018, were carefully reviewed and selected from 892 submissions.

Developments in Advanced Control and Intelligent Automation for Complex Systems Min Wu 2021-03-26 This book discusses the developments in the advanced control and intelligent automation for complex systems completed over the last two decades, including the progress in advanced control theory and method, intelligent control and decision-making of complex metallurgical processes, intelligent systems and machine learning, intelligent robot systems design and control, and prediction and control technology for renewable energy. With the depth and breadth of coverage of this book, it serves as a useful reference for engineers in the field of automation and complex process control and graduate students interested in advanced control theory and computational intelligence as well as their applications to the complex industrial processes. This book offers an up-to-date overview of this active research area. It provides readers with the state-of-the-art methods for advanced control and intelligent automation for complex systems

Fractional Order Control and Synchronization of Chaotic Systems Ahmad Taher Azar 2017-02-27 The book reports on the latest advances in and applications of fractional order control and synchronization of chaotic systems, explaining the concepts involved in a clear, matter-of-fact style. It consists of 30 original contributions written by eminent scientists and active researchers in the field that address theories, methods and applications in a number of research areas related to fractional order control and synchronization of chaotic systems, such as: fractional chaotic systems, hyperchaotic systems, complex systems, fractional order discrete chaotic systems, chaos control, chaos synchronization, jerk circuits, fractional chaotic systems with hidden attractors, neural network, fuzzy logic controllers, behavioral modeling, robust and adaptive control, sliding mode control, different types of synchronization, circuit realization of chaotic systems, etc. In addition to providing readers extensive information on chaos fundamentals, fractional calculus, fractional differential equations, fractional control and stability, the book also discusses key applications of fractional order chaotic systems, as well as multidisciplinary solutions developed via control modeling. As such, it offers the perfect reference guide for graduate students, researchers and practitioners in the areas of fractional order control systems and fractional order chaotic systems.

Advances in Engineering Design Pawan Kumar Rakesh 2021-02-04 This book presents the selected peer-reviewed proceedings of the International Conference on Innovative Engineering Design (ICOIED 2020). The contents provide a multidisciplinary approach for the development of innovative product design and their benefits for the society. The book presents latest advances in various fields like design process, service development, micro/nano technology, sensors and MEMS, and sustainability in engineering design. The book will be useful for students, researchers, and professionals interested in innovative product/process design and development.

Advanced Technologies in Modern Robotic Applications

Wojciech Mitkowski 2017-06-06 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 Krak? w, 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.

Neural Information Processing Derong Liu 2017-11-07 The six volume set LNCS 10634, LNCS 10635, LNCS 10636, LNCS 10637, LNCS 10638, and LNCS 10639 constitues the proceedings of the 24rd International Conference on Neural Information Processing, ICONIP 2017, held in Guangzhou, China, in November 2017. The 563 full papers presented were carefully reviewed and selected from 856 submissions. The 6 volumes are organized in topical sections on Machine Learning, Reinforcement Learning, Big Data Analysis, Deep Learning, Brain-Computer Interface, Computational Finance, Computer Vision, Neurodynamics, Sensory Perception and Decision Making, Computational Intelligence, Neural Data Analysis, Biomedical Engineering, Emotion and Bayesian Networks, Data Mining, Time-Series Analysis, Social Networks, Bioinformatics, Information Security and Social Cognition, Robotics and Control, Pattern Recognition, Neuromorphic Hardware and Speech Processing.

Advanced Mobile Robotics DaeEun Kim 2020-03-06 Mobile robotics is a challenging field with great potential. It covers disciplines including electrical engineering, mechanical engineering, computer science, cognitive science, and social science. It is essential to the design of automated robots, in combination with artificial intelligence, vision, and sensor technologies. Mobile robots are widely used for surveillance, guidance, transportation and entertainment tasks, as well as medical applications. This Special Issue intends to concentrate on recent developments concerning mobile robots and the research surrounding them to enhance studies on the fundamental problems observed in the robots. Various multidisciplinary approaches and integrative contributions including navigation, learning and adaptation, networked system, biologically inspired robots and cognitive methods are welcome contributions to this Special Issue, both from a research and an application perspective.

Chenguang Yang 2016-05-18 This book presents in a systematic manner the advanced technologies used for various modern robot applications. By bringing fresh ideas, new concepts, novel methods and tools into robot control, robot vision, human robot interaction, teleoperation of robot and multiple robots system, we are to provide a state-of-the-art and comprehensive treatment of the advanced technologies for a wide range of robotic applications. Particularly, we focus on the topics of advanced control and obstacle avoidance techniques for robot to deal with unknown perturbations, of visual servoing techniques which enable robot to autonomously operate in a dynamic environment, and of advanced techniques involved in human robot interaction. The book is primarily intended for researchers and engineers in the robotic and control community. It can also serve as complementary reading for robotics at the both graduate and undergraduate levels.

Mobile Service Robotics Krzysztof Koz? owski 2014-07-07 Interest in control of climbing and walking robots has remarkably increased over the years. Novel solutions of complex mechanical systems such as climbing, walking, flying and running robots with different kinds of locomotion and the technologies that support them and their applications are the evidence of significant progress in the area of robotics. Supporting technologies include the means by which robots use to sense, model, and navigate through their environments and, of course, actuation and control technologies. Human interaction including exoskeletons, prostheses and orthoses, as well as service robots, are increasingly active important pertinent areas of research. In addition, legged machines and tracked platforms with software architecture seem to be currently the research idea of most interest to the robotics community. Contents:Plenary PresentationsAssistive RobotsAutonomous RobotsBiologically-Inspired Systems and SolutionsInnovative Design of CLAWARInnovative Sensing and ActuationLocomotionManipulation and GrippingManufacturing, Construction and Underwater RobotsMedical and Rehabilitation RobotsModelling and Simulation of CLAWARPerception, Localisation, Planning and ControlService RobotsRobot Ethics Readership: Systems and control engineers, electrical engineers, mechanical engineers in academic, research and industrial settings. Engineers and practitioners in the public services sectors in health care, manufacturing, supply and delivery services. Key Features:The book will contain extended versions of the conference presentations. Contrary to typical proceedings collections it has an extended form of presentation — particular chapters will contain exhaustive descriptions of the solved problemsIt is intended that the Conference is the forum of technical discussion and interchange of ideas for people both from universities and industry. Because of this it is addressed to a wide group of readers: researchers, PhD students and practitionersProminent professors deliver plenary presentationsKeywords:Assistive Robotics;Autonomous Robots;Biologically Inspired Robotics;CLAWAR;Climbing and Walking Robots;Design of CLAWAR;Hybrid Locomotion;Legged Locomotion;Mobile Robots;Modeling and Simulation;Planning and Control;Robot Standardization;Service Robotics;Wheeled Locomotion

Innovation in Electrical Power Engineering, Communication, and Computing Technology Renu Sharma 2020-02-21 This book features selected high-quality papers from the International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology (IEPCCT 2019), held at Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, India, on 13–14 December 2019. Presenting innovations in power, communication, and computing, it covers topics such as mini, micro, smart and future power grids; power system economics; energy storage systems; intelligent control; power converters; improving power quality; signal processing; sensors and actuators; image/video processing; high-performance data mining algorithms; advances in deep learning; and optimization methods.

Adaptive Mobile Robotics

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