

Autonomous Helicopter Formation Using Model Predictive Control

Eventually, you will unconditionally discover a supplementary experience and ability by spending more cash. yet when? realize you take that you require to acquire those all needs past having significantly cash? Why dont you try to acquire something basic in the beginning? Thats something that will lead you to comprehend even more something like the globe, experience, some places, similar to history, amusement, and a lot more?

It is your completely own time to take steps reviewing habit. among guides you could enjoy now is **autonomous helicopter formation using model predictive control** below.

Predictive Control for Linear and Hybrid Systems - Francesco Borrelli 2017-06-22

With a simple approach that includes real-time applications and algorithms, this book covers the theory of model predictive control (MPC).

Robot Operating System (ROS) - Anis Koubaa 2017-05-25

This second volume is a continuation of the successful first volume of this Springer book, and as well as addressing broader topics it puts a particular focus on unmanned aerial vehicles (UAVs) with Robot Operating System (ROS). Consisting of three types of chapters: tutorials, cases studies, and research papers, it provides comprehensive additional material on ROS and the aspects of developing robotics systems, algorithms, frameworks, and applications with ROS. ROS is being increasingly integrated in almost all kinds of robots and is becoming the de-facto standard for developing applications and systems for robotics. Although the research community is actively developing applications with ROS and extending its features, amount of literature references is not representative of the huge amount of work being done. The book includes 19 chapters organized into six parts: Part 1 presents the control of UAVs with ROS, while in Part 2, three chapters deal with control of mobile robots. Part 3 provides recent work toward integrating ROS with Internet, cloud and distributed systems. Part 4 offers five case studies of service robots and field experiments. Part 5 presents signal-processing tools for perception and sensing, and lastly, Part 6 introduces advanced simulation frameworks.

The diversity of topics in the book makes it a unique and valuable reference resource for ROS users, researchers, learners and developers.

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Intelligent Autonomous Systems 14 -

Weidong Chen 2017-02-10

This book describes the latest research advances, innovations, and visions in the field of robotics as presented by leading researchers, engineers, and practitioners from around the world at the 14th International Conference on Intelligent Autonomous Systems (IAS-14), held in Shanghai, China in July 2016. The contributions amply demonstrate that robots, machines and systems are rapidly achieving intelligence and autonomy, attaining more and more capabilities such as mobility and manipulation, sensing and perception, reasoning, and decision-making. They cover a wide range of research results and applications,

and particular attention is paid to the emerging role of autonomous robots and intelligent systems in industrial production, which reflects their maturity and robustness. The contributions were selected by means of a rigorous peer-review process and highlight many exciting and visionary ideas that will further galvanize the research community and spur novel research directions. The series of biennial IAS conferences, which began in 1986, represents a premiere event in the field of robotics.

Automatic Flight Control Systems - Thomas Lombaerts 2012-01-18

The history of flight control is inseparably linked to the history of aviation itself. Since the early days, the concept of automatic flight control systems has evolved from mechanical control systems to highly advanced automatic fly-by-wire flight control systems which can be found nowadays in military jets and civil airliners. Even today, many research efforts are made for the further development of these flight control systems in various aspects. Recent new developments in this field focus on a wealth of different aspects. This book focuses on a selection of key research areas, such as inertial navigation, control of unmanned aircraft and helicopters, trajectory control of an unmanned space re-entry vehicle, aeroservoelastic control, adaptive flight control, and fault tolerant flight control. This book consists of two major sections. The first section focuses on a literature review and some recent theoretical developments in flight control systems. The second section discusses some concepts of adaptive and fault-tolerant flight control systems. Each technique discussed in this book is illustrated by a relevant example.

Autonomous Robots - Farbod Fahimi 2008-10-25

It is at least two decades since the conventional robotic manipulators have become a common manufacturing tool for different industries, from automotive to pharmaceutical. The proven benefits of utilizing robotic manipulators for manufacturing in different industries motivated scientists and researchers to try to extend the applications of robots to many other areas by inventing several new types of robots other than conventional manipulators. The new types of robots can be categorized in two groups;

redundant (and hyper-redundant) manipulators, and mobile (ground, marine, and aerial) robots. These groups of robots, known as advanced robots, have more freedom for their mobility, which allows them to do tasks that the conventional manipulators cannot do. Engineers have taken advantage of the extra mobility of the advanced robots to make them work in constrained environments, ranging from limited joint motions for redundant (or hyper-redundant) manipulators to obstacles in the way of mobile (ground, marine, and aerial) robots. Since these constraints usually depend on the work environment, they are variable. Engineers have had to invent methods to allow the robots to deal with a variety of constraints automatically. A robot that is equipped with those methods is called an Autonomous Robot. Autonomous Robots: Kinematics, Path Planning, and Control covers the kinematics and dynamic modeling/analysis of Autonomous Robots, as well as the methods suitable for their control. The text is suitable for mechanical and electrical engineers who want to familiarize themselves with methods of modeling/analysis/control that have been proven efficient through research.

Proceedings of the 11th International Conference on Modelling, Identification and Control (ICMC2019)- Rui Wang 2019-12-03

This book includes original, peer-reviewed research papers from the 11th International Conference on Modelling, Identification and Control (ICMIC2019), held in Tianjin, China on July 13-15, 2019. The topics covered include but are not limited to: System Identification, Linear/Nonlinear Control Systems, Data-driven Modelling and Control, Process Modelling and Process Control, Fault Diagnosis and Reliable Control, Intelligent Systems, and Machine Learning and Artificial Intelligence. The papers showcased here share the latest findings on methodologies, algorithms and applications in modelling, identification, and control, integrated with Artificial Intelligence (AI), making the book a valuable asset for researchers, engineers, and university students alike.

Towards Autonomous Robotic Systems - Lyuba Alboul 2016-06-24

This book constitutes the refereed proceedings of the 17th Annual Conference on Towards Autonomous Robotics, TAROS 2016, held in

Sheffield UK, in June/July 2016. The 23 revised full papers presented together with 15 short papers were carefully reviewed and selected from 56 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.

Research Anthology on Reliability and Safety in Aviation Systems, Spacecraft, and Air Transport - Management Association, Information Resources 2020-09-24

As with other transportation methods, safety issues in aircraft can result in a total loss of life. Recently, the air transport industry has come under immense scrutiny after several deaths occurred due to aircraft design and airlines that allowed improperly inspected aircraft to fly. Spacecraft too have found errors in system software that could lead to catastrophic failure. It is imperative that the aviation and aerospace industries continue to revise and refine safety protocols from the construction and design of aircraft, to secure and improve aviation systems, and to test and inspect aircraft. The *Research Anthology on Reliability and Safety in Aviation Systems, Spacecraft, and Air Transport* is a vital reference source that examines the latest scholarly material on the use of adaptive and assistive technologies in aviation to establish clear guidelines for the design and implementation of such technologies to better serve the needs of both military and civilian pilots. It also covers new information technology use in aviation systems to streamline the cybersecurity, decision making, planning, and design processes within the aviation industry. Highlighting a range of topics such as air navigation systems, computer simulation, and airline operations, this multi-volume book is ideally designed for pilots, scientists, engineers, aviation operators, air traffic controllers, air crash investigators, teachers, academicians, researchers, and students.

Developments in Model-Based Optimization and Control - Sorin Olaru 2015-12-23

This book deals with optimization methods as tools for decision making and control in the presence of model uncertainty. It is oriented to the use of these tools in engineering, specifically

in automatic control design with all its components: analysis of dynamical systems, identification problems, and feedback control design. *Developments in Model-Based Optimization and Control* takes advantage of optimization-based formulations for such classical feedback design objectives as stability, performance and feasibility, afforded by the established body of results and methodologies constituting optimal control theory. It makes particular use of the popular formulation known as predictive control or receding-horizon optimization. The individual contributions in this volume are wide-ranging in subject matter but coordinated within a five-part structure covering material on: · complexity and structure in model predictive control (MPC); · collaborative MPC; · distributed MPC; · optimization-based analysis and design; and · applications to bioprocesses, multivehicle systems or energy management. The various contributions cover a subject spectrum including inverse optimality and more modern decentralized and cooperative formulations of receding-horizon optimal control. Readers will find fourteen chapters dedicated to optimization-based tools for robustness analysis, and decision-making in relation to feedback mechanisms—fault detection, for example—and three chapters putting forward applications where the model-based optimization brings a novel perspective. *Developments in Model-Based Optimization and Control* is a selection of contributions expanded and updated from the *Optimisation-based Control and Estimation* workshops held in November 2013 and November 2014. It forms a useful resource for academic researchers and graduate students interested in the state of the art in predictive control. Control engineers working in model-based optimization and control, particularly in its bioprocess applications will also find this collection instructive.

Unmanned Rotorcraft Systems - Guowei Cai 2011-06-01

Unmanned Rotorcraft Systems explores the research and development of fully-functional miniature UAV (unmanned aerial vehicle) rotorcraft, and provides a complete treatment of the design of autonomous miniature rotorcraft UAVs. The unmanned system is an integration of advanced technologies developed in

communications, computing, and control areas, and is an excellent testing ground for trialing and implementing modern control techniques. Included are detailed expositions of systematic hardware construction, software systems integration, aerodynamic modeling; and automatic flight control system design. Emphasis is placed on the cooperative control and flight formation of multiple UAVs, vision-based ground target tracking, and landing on moving platforms. Other issues such as the development of GPS-less indoor micro aerial vehicles and vision-based navigation are also discussed in depth: utilizing the vision-based system for accomplishing ground target tracking, attacking and landing, cooperative control and flight formation of multiple unmanned rotorcraft; and future research directions on the related areas.

Aerospace Robotics - Jerzy Sasiadek
2013-03-19

This book presents the most important and crucial problems of space automation in context of future exploration programs. These programs could involve such issues as space situational awareness program, planetary protection, exploitation of minerals, assembly, manufacturing, and search for new habitable location for next human generations. The future exploration of Space and related activities will involve robots. In particular, new autonomous robots need to be developed with high degree of intelligence. Such robots would make space exploration possible but also they would make space automation an important factor in variety of activities related to Space.

Cases on Modern Computer Systems in Aviation - Shmelova, Tetiana 2019-02-19

Because trainees need to learn about the underlying technologies to use automation safely and efficiently, the development of automated aviation systems training is a growing challenge. Task analysis has been singled out as the basis of the training, but it can be more time-consuming than traditional development techniques. Cases on Modern Computer Systems in Aviation is an essential reference source that covers new information technology use in aviation systems to streamline the cybersecurity, decision-making, planning, and design processes within the aviation industry. Featuring coverage

on a broad range of topics such as computer systems in aviation, artificial intelligence, software-defined networking (SDN), air navigation systems, decision support systems (DSS), and more, this publication is ideally designed for aviation specialists and industry professionals, technicians, practitioners, researchers, and academicians seeking current research on modern modeling approaches to streamline management in aviation.

[Decadal Survey of Civil Aeronautics](#) - National Research Council 2006-10-27

The U.S. air transportation system is very important for our economic well-being and national security. The nation is also the global leader in civil and military aeronautics, a position that needs to be maintained to help assure a strong future for the domestic and international air transportation system. Strong action is needed, however, to ensure that leadership role continues. To that end, the Congress and NASA requested the NRC to undertake a decadal survey of civil aeronautics research and technology (R&T) priorities that would help NASA fulfill its responsibility to preserve U.S. leadership in aeronautics technology. This report presents a set of strategic objectives for the next decade of R&T. It provides a set of high-priority R&T challenges—characterized by five common themes—for both NASA and non-NASA researchers, and an analysis of key barriers that must be overcome to reach the strategic objectives. The report also notes the importance of synergies between civil aeronautics R&T objectives and those of national security.

Dissertation Abstracts International - 2009

Journal of Guidance, Control, and Dynamics
2009

National Academy of Sciences' decadal plan for aeronautics : hearings -

[Discrete Networked Dynamic Systems](#) - Magdi S. Mahmoud 2020-11-09

Discrete Networked Dynamic Systems: Analysis and Performance provides a high-level treatment of a general class of linear discrete-time dynamic systems interconnected over an information network, exchanging relative state

measurements or output measurements. It presents a systematic analysis of the material and provides an account to the math development in a unified way. The topics in this book are structured along four dimensions: Agent, Environment, Interaction, and Organization, while keeping global (system-centered) and local (agent-centered) viewpoints. The focus is on the wide-sense consensus problem in discrete networked dynamic systems. The authors rely heavily on algebraic graph theory and topology to derive their results. It is known that graphs play an important role in the analysis of interactions between multiagent/distributed systems. Graph-theoretic analysis provides insight into how topological interactions play a role in achieving coordination among agents. Numerous types of graphs exist in the literature, depending on the edge set of G . A simple graph has no self-loop or edges. Complete graphs are simple graphs with an edge connecting any pair of vertices. The vertex set in a bipartite graph can be partitioned into disjoint non-empty vertex sets, whereby there is an edge connecting every vertex in one set to every vertex in the other set. Random graphs have fixed vertex sets, but the edge set exhibits stochastic behavior modeled by probability functions. Much of the studies in coordination control are based on deterministic/fixed graphs, switching graphs, and random graphs. This book addresses advanced analytical tools for characterization control, estimation and design of networked dynamic systems over fixed, probabilistic and time-varying graphs Provides coherent results on adopting a set-theoretic framework for critically examining problems of the analysis, performance and design of discrete distributed systems over graphs Deals with both homogeneous and heterogeneous systems to guarantee the generality of design results

Model Predictive Control System Design and Implementation Using MATLAB® - Liuping Wang 2009-02-14

Model Predictive Control System Design and Implementation Using MATLAB® proposes methods for design and implementation of MPC systems using basis functions that confer the following advantages: - continuous- and discrete-time MPC problems solved in similar design frameworks; - a parsimonious parametric

representation of the control trajectory gives rise to computationally efficient algorithms and better on-line performance; and - a more general discrete-time representation of MPC design that becomes identical to the traditional approach for an appropriate choice of parameters. After the theoretical presentation, coverage is given to three industrial applications. The subject of quadratic programming, often associated with the core optimization algorithms of MPC is also introduced and explained. The technical contents of this book is mainly based on advances in MPC using state-space models and basis functions. This volume includes numerous analytical examples and problems and MATLAB® programs and exercises.

Formation and Containment Control for High-order Linear Swarm Systems - Xiwang Dong 2015-07-18

This book focuses on analysis and design problems for high-order linear time-invariant (LTI) swarm systems (multi-agent systems) to achieve consensus, formation, containment and formation-containment. As a first step, the concepts of practical consensus and formation-containment are introduced. Unlike previous research, the formation in this book can be time-varying. A general framework for consensus, consensus tracking, formation, containment and state formation-containment is presented for the first time. Sufficient/necessary and sufficient conditions, and approaches to designing the protocols for swarm systems to achieve these control objectives, are respectively proposed. Autonomous time-varying formation experiments using five quadrotor unmanned aerial vehicles (UAVs) are conducted in an outdoor setting to demonstrate the theoretical results.

International Aerospace Abstracts - 1999

Autonomous Flying Robots Kenzo Nonami 2010-09-15

The advance in robotics has boosted the application of autonomous vehicles to perform tedious and risky tasks or to be cost-effective substitutes for their - man counterparts. Based on their working environment, a rough classification of the autonomous vehicles would include unmanned aerial vehicles (UAVs), - manned ground vehicles (UGVs), autonomous underwater vehicles (AUVs), and autonomous

surface vehicles (ASVs). UAVs, UGVs, AUVs, and ASVs are called UVs (unmanned vehicles) nowadays. In recent decades, the development of - manned autonomous vehicles have been of great interest, and different kinds of autonomous vehicles have been studied and developed all over the world. In particular, UAVs have many applications in emergency situations; humans often cannot come close to a dangerous natural disaster such as an earthquake, a flood, an active volcano, or a nuclear disaster. Since the development of the first UAVs, research efforts have been focused on military applications. Recently, however, demand has arisen for UAVs such as aero-robots and flying robots that can be used in emergency situations and in industrial applications. Among the wide variety of UAVs that have been developed, small-scale HUAVs (helicopter-based UAVs) have the ability to take off and land vertically as well as the ability to cruise in flight, but their most important capability is hovering. Hovering at a point enables us to make more effective observations of a target. Furthermore, small-scale HUAVs offer the advantages of low cost and easy operation.

Unmanned Aerial Systems - Anis Koubaa
2021-01-21

Unmanned Aerial Systems: Theoretical Foundation and Applications presents some of the latest innovative approaches to drones from the point-of-view of dynamic modeling, system analysis, optimization, control, communications, 3D-mapping, search and rescue, surveillance, farmland and construction monitoring, and more. With the emergence of low-cost UAS, a vast array of research works in academia and products in the industrial sectors have evolved. The book covers the safe operation of UAS, including, but not limited to, fundamental design, mission and path planning, control theory, computer vision, artificial intelligence, applications requirements, and more. This book provides a unique reference of the state-of-the-art research and development of unmanned aerial systems, making it an essential resource for researchers, instructors and practitioners. Covers some of the most innovative approaches to drones Provides the latest state-of-the-art research and development surrounding unmanned aerial systems Presents a comprehensive reference on unmanned aerial

systems, with a focus on cutting-edge technologies and recent research trends in the area

The National Academy of Sciences' Decadal Plan for Aeronautics - United States. Congress. House. Committee on Science. Subcommittee on Space and Aeronautics 2007

Model-Based Control of Flying Robots for Robust Interaction Under Wind Influence - Teodor Tomić 2022-10-07

This book addresses the topic of autonomous flying robots physically interacting with the environment under the influence of wind. It aims to make aerial robots aware of the disturbance, interaction, and faults acting on them. This requires reasoning about the external wrench (force and torque) acting on the robot and distinguishing between wind, interactions, and collisions. The book takes a model-based approach and covers a systematic approach to parameter identification for flying robots. The book aims to provide a wind speed estimate independent of the external wrench, including estimating the wind speed using motor power measurements. Aerodynamics modeling is approached in a data-driven fashion, using ground-truth measurements from a 4D wind tunnel. Finally, the book bridges the gap between trajectory tracking and interaction control, to allow physical interaction under wind influence. Theoretical results are accompanied by extensive simulation and experimental results.

Handbook of Marine Craft Hydrodynamics and Motion Control - Thor I. Fossen 2021-04-16

Handbook of MARINE CRAFT HYDRODYNAMICS AND MOTION CONTROL
The latest tools for analysis and design of advanced GNC systems Handbook of Marine Craft Hydrodynamics and Motion Control is an extensive study of the latest research in hydrodynamics, guidance, navigation, and control systems for marine craft. The text establishes how the implementation of mathematical models and modern control theory can be used for simulation and verification of control systems, decision-support systems, and situational awareness systems. Coverage includes hydrodynamic models for marine craft, models for wind, waves and ocean currents,

dynamics and stability of marine craft, advanced guidance principles, sensor fusion, and inertial navigation. This important book includes the latest tools for analysis and design of advanced GNC systems and presents new material on unmanned underwater vehicles, surface craft, and autonomous vehicles. References and examples are included to enable engineers to analyze existing projects before making their own designs, as well as MATLAB scripts for hands-on software development and testing. Highlights of this Second Edition include: Topical case studies and worked examples demonstrating how you can apply modeling and control design techniques to your own designs A Github repository with MATLAB scripts (MSS toolbox) compatible with the latest software releases from Mathworks New content on mathematical modeling, including models for ships and underwater vehicles, hydrostatics, and control forces and moments New methods for guidance and navigation, including line-of-sight (LOS) guidance laws for path following, sensory systems, model-based navigation systems, and inertial navigation systems This fully revised Second Edition includes innovative research in hydrodynamics and GNC systems for marine craft, from ships to autonomous vehicles operating on the surface and under water. Handbook of Marine Craft Hydrodynamics and Motion Control is a must-have for students and engineers working with unmanned systems, field robots, autonomous vehicles, and ships. MSS toolbox: <https://github.com/cybergalactic/mss> Lecture notes: <https://www.fossen.biz/wiley> Author's home page: <https://www.fossen.biz>

Motion Coordination for VTOL Unmanned Aerial Vehicles - Abdelkader Abdessameud
2013-05-26

Motion Coordination for VTOL Unmanned Aerial Vehicles develops new control design techniques for the distributed coordination of a team of autonomous unmanned aerial vehicles. In particular, it provides new control design approaches for the attitude synchronization of a formation of rigid body systems. In addition, by integrating new control design techniques with some concepts from nonlinear control theory and multi-agent systems, it presents a new theoretical framework for the formation control of a class of under-actuated aerial vehicles

capable of vertical take-off and landing. Several practical problems related to the systems' inputs, states measurements, and restrictions on the interconnection topology between the aerial vehicles in the team are addressed. Worked examples with sufficient details and simulation results are provided to illustrate the applicability and effectiveness of the theoretical results discussed in the book. The material presented is primarily intended for researchers and industrial engineers from robotics, control engineering and aerospace communities. It also serves as a complementary reading for graduate students involved in research related to flying robotics, aerospace, control of under-actuated systems, and nonlinear control theory

Time-Critical Cooperative Control of Autonomous Air Vehicles - Isaac Kaminer
2017-08-02

Time-Critical Cooperative Control of Autonomous Air Vehicles presents, in an easy-to-read style, the latest research conducted in the industry, while also introducing a set of novel ideas that illuminate a new approach to problem-solving. The book is virtually self-contained, giving the reader a complete, integrated presentation of the different concepts, mathematical tools, and control solutions needed to tackle and solve a number of problems concerning time-critical cooperative control of UAVs. By including case studies of fixed-wing and multirotor UAVs, the book effectively broadens the scope of application of the methodologies developed. This theoretical presentation is complemented with the results of flight tests with real UAVs, and is an ideal reference for researchers and practitioners from academia, research labs, commercial companies, government workers, and those in the international aerospace industry. Addresses important topics related to time-critical cooperative control of UAVs Describes solutions to the problems rooted in solid dynamical systems theory Applies the solutions developed to fixed-wing and multirotor UAVs Includes the results of field tests with both classes of UAVs
Aerospace America - 2001

Modelling and Simulation for Autonomous Systems - Jan Mazal 2018-03-06

This book constitutes the thoroughly refereed

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post-workshop proceedings of the 4th International Workshop on Modelling and Simulation for Autonomous Systems, MESAS 2017, held in Rome, Italy, in October 2017. The 33 revised full papers included in the volume were carefully reviewed and selected from 38 submissions. They are organized in the following topical sections: M&S of Intelligent Systems - AI, R&D and Applications; Autonomous Systems in Context of Future Warfare and Security - Concepts, Applications, Standards and Legislation; Future Challenges and Opportunities of Advanced M&S Technology.

Modeling, Control and Coordination of Helicopter Systems Beibei Ren 2012-02-02

Modeling, Control and Coordination of Helicopter Systems provides a comprehensive treatment of helicopter systems, ranging from related nonlinear flight dynamic modeling and stability analysis to advanced control design for single helicopter systems, and also covers issues related to the coordination and formation control of multiple helicopter systems to achieve high performance tasks. Ensuring stability in helicopter flight is a challenging problem for nonlinear control design and development. This book is a valuable reference on modeling, control and coordination of helicopter systems, providing readers with practical solutions for the problems that still plague helicopter system design and implementation. Readers will gain a complete picture of helicopters at the systems level, as well as a better understanding of the technical intricacies involved.

UAV Sensors for Environmental Monitoring Felipe Gonzalez Toro 2018-03-05

This book is a printed edition of the Special Issue "UAV Sensors for Environmental Monitoring" that was published in *Sensors Experimental Robotics* Oussama Khatib 2009-04-22

By the dawn of the new millennium, robotics has undergone a major transformation in scope and dimensions. This expansion has been brought about by the maturity of the field and the advances in its related technologies. From a largely dominant industrial focus, robotics has been rapidly expanding into the challenges of the human world. The new generation of robots is expected to safely and dependably co-habitat

with humans in homes, workplaces, and communities, providing support in services, entertainment, education, healthcare, manufacturing, and assistance. Beyond its impact on physical robots, the body of knowledge robotics has produced is revealing a much wider range of applications reaching across diverse research areas and scientific disciplines, such as: biomechanics, haptics, neuro-ences, virtual simulation, animation, surgery, and sensor networks among others. In return, the challenges of the new emerging areas are proving an abundant source of stimulation and insights for the field of robotics. It is indeed at the intersection of disciplines that the most striking advances happen. The goal of the series of Springer Tracts in Advanced Robotics (STAR) is to bring, in a timely fashion, the latest advances and developments in robotics on the basis of their significance and quality. It is our hope that the wider dissemination of research developments will stimulate more exchanges and collaborations among the research community and contribute to further advancement of this rapidly growing field.

Advances in Swarm Intelligence, Part II - Ying Tan 2011-05-26

The two-volume set (LNCS 6728 and 6729) constitutes the refereed proceedings of the International Conference on Swarm Intelligence, ICSI 2011, held in Chongqing, China, in June 2011. The 143 revised full papers presented were carefully reviewed and selected from 298 submissions. The papers are organized in topical sections on theoretical analysis of swarm intelligence algorithms, particle swarm optimization, applications of pso algorithms, ant colony optimization algorithms, bee colony algorithms, novel swarm-based optimization algorithms, artificial immune system, differential evolution, neural networks, genetic algorithms, evolutionary computation, fuzzy methods, and hybrid algorithms - for part I. Topics addressed in part II are such as multi-objective optimization algorithms, multi-robot, swarm-robot, and multi-agent systems, data mining methods, machine learning methods, feature selection algorithms, pattern recognition methods, intelligent control, other optimization algorithms and applications, data fusion and

swarm intelligence, as well as fish school search - foundations and applications.

Modelling and Control of Mini-Flying Machines - Pedro Castillo Garcia 2005-06

Problems in the motion control of aircraft are of perennial interest to the control engineer as they tend to be of complex and nonlinear nature.

Modelling and Control of Mini-Flying Machines is an exposition of models developed for various types of mini-aircraft: • planar Vertical Take-off and Landing aircraft; • helicopters; • quadrotor mini-rotorcraft; • other fixed-wing aircraft; • blimps. For each of these it propounds: • detailed models derived from Euler-Lagrange methods; • appropriate nonlinear control strategies and convergence properties; • real-time experimental comparisons of the performance of control algorithms; • review of the principal sensors, on-board electronics, real-time architecture and communications systems for mini-flying machine control, including discussion of their performance; • detailed explanation of the use of the Kalman filter to flying machine localization. To researchers and students in nonlinear control and its applications Modelling and Control of Mini-Flying Machines provides valuable insights to the application of real-time nonlinear techniques in an always challenging area. Advances in Industrial Control aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

Predictive Control Yugeng Xi 2019-07-02

This book is a comprehensive introduction to model predictive control (MPC), including its basic principles and algorithms, system analysis and design methods, strategy developments and practical applications. The main contents of the book include an overview of the development trajectory and basic principles of MPC, typical MPC algorithms, quantitative analysis of classical MPC systems, design and tuning methods for MPC parameters, constrained multivariable MPC algorithms and online optimization decomposition methods. Readers will then progress to more advanced topics such as nonlinear MPC and its related algorithms, the

diversification development of MPC with respect to control structures and optimization strategies, and robust MPC. Finally, applications of MPC and its generalization to optimization-based dynamic problems other than control will be discussed. Systematically introduces fundamental concepts, basic algorithms, and applications of MPC. Includes a comprehensive overview of MPC development, emphasizing recent advances and modern approaches. Features numerous MPC models and structures, based on rigorous research. Based on the best-selling Chinese edition, which is a key text in China Predictive Control: Fundamentals and Developments is written for advanced undergraduate and graduate students and researchers specializing in control technologies. It is also a useful reference for industry professionals, engineers, and technicians specializing in advanced optimization control technology.

Nonlinear Model Predictive Control - Lalo Magni 2009-05-25

Over the past few years significant progress has been achieved in the field of nonlinear model predictive control (NMPC), also referred to as receding horizon control or moving horizon control. More than 250 papers have been published in 2006 in ISI Journals. With this book we want to bring together the contributions of a diverse group of internationally well recognized researchers and industrial practitioners, to critically assess the current status of the NMPC field and to discuss future directions and needs. The book consists of selected papers presented at the International Workshop on Assessment and Future Directions of Nonlinear Model Predictive Control that took place from September 5 to 9, 2008, in Pavia, Italy.

Advances in Guidance, Navigation and Control - Liang Yan 2021-11-12

This book features the latest theoretical results and techniques in the field of guidance, navigation, and control (GNC) of vehicles and aircraft. It covers a range of topics, including, but not limited to, intelligent computing communication and control; new methods of navigation, estimation, and tracking; control of multiple moving objects; manned and autonomous unmanned systems; guidance, navigation, and control of miniature aircraft; and

sensor systems for guidance, navigation, and control. Presenting recent advances in the form of illustrations, tables, and text, it also provides detailed information of a number of the studies, to offer readers insights for their own research. In addition, the book addresses fundamental concepts and studies in the development of GNC, making it a valuable resource for both beginners and researchers wanting to further their understanding of guidance, navigation, and control.

Cross-Layer Design for Secure and Resilient Cyber-Physical Systems - Quanyan Zhu

2020-11-16

This book introduces a cross-layer design to achieve security and resilience for CPSs (Cyber-Physical Systems). The authors interconnect various technical tools and methods to capture the different properties between cyber and physical layers. Part II of this book bridges the gap between cryptography and control-theoretic tools. It develops a bespoke crypto-control framework to address security and resiliency in control and estimation problems where the outsourcing of computations is possible. Part III of this book bridges the gap between game theory and control theory and develops interdependent impact-aware security defense strategies and cyber-aware resilient control strategies. With the rapid development of smart cities, there is a growing need to integrate the physical systems, ranging from large-scale infrastructures to small embedded systems, with networked communications. The integration of the physical and cyber systems forms Cyber-Physical Systems (CPSs), enabling the use of digital information and control technologies to improve the monitoring, operation, and planning of the systems. Despite these advantages, they are vulnerable to cyber-physical attacks, which aim to damage the physical layer through the cyber network. This book also uses case studies from autonomous systems, communication-based train control systems, cyber manufacturing, and robotic systems to illustrate the proposed methodologies. These case studies aim to motivate readers to adopt a cross-layer system perspective toward security and resilience issues of large and complex systems and develop

domain-specific solutions to address CPS challenges. A comprehensive suite of solutions to a broad range of technical challenges in secure and resilient control systems are described in this book (many of the findings in this book are useful to anyone working in cybersecurity). Researchers, professors, and advanced-level students working in computer science and engineering will find this book useful as a reference or secondary text. Industry professionals and military workers interested in cybersecurity will also want to purchase this book.

Autonomous Flying Robots - Kenzo Nonami

2014-11-16

The advance in robotics has boosted the application of autonomous vehicles to perform tedious and risky tasks or to be cost-effective substitutes for their - man counterparts. Based on their working environment, a rough classification of the autonomous vehicles would include unmanned aerial vehicles (UAVs), - manned ground vehicles (UGVs), autonomous underwater vehicles (AUVs), and autonomous surface vehicles (ASVs). UAVs, UGVs, AUVs, and ASVs are called UVs (unmanned vehicles) nowadays. In recent decades, the development of - manned autonomous vehicles have been of great interest, and different kinds of autonomous vehicles have been studied and developed all over the world. In particular, UAVs have many applications in emergency situations; humans often cannot come close to a dangerous natural disaster such as an earthquake, a flood, an active volcano, or a nuclear disaster. Since the development of the first UAVs, research efforts have been focused on military applications. Recently, however, demand has arisen for UAVs such as aero-robots and flying robots that can be used in emergency situations and in industrial applications. Among the wide variety of UAVs that have been developed, small-scale HUAVs (helicopter-based UAVs) have the ability to take off and land vertically as well as the ability to cruise in flight, but their most important capability is hovering. Hovering at a point enables us to make more effective observations of a target. Furthermore, small-scale HUAVs offer the advantages of low cost and easy operation.