

Autonomous Helicopter Formation Using Model Predictive Control

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 Quad Rotorcraft Control
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 Computer Science for Environmental Engineering and Ecolnformatics
 Unmanned Rotorcraft Systems
 Dissertation Abstracts International
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 Unmanned Aircraft Systems
 Modeling, Control and Coordination of Helicopter Systems
 Formation Control of Multiple Autonomous Vehicle Systems

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Autonomous Robots Springer

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.

Cutting Edge Robotics 2010 John Wiley & Sons

Quad Rotorcraft Control develops original control methods for the navigation and hovering flight of an autonomous mini-quad-rotor robotic helicopter. These methods use an imaging system and a combination of inertial and altitude sensors to localize and guide the movement of the unmanned aerial vehicle relative to its immediate environment. The history, classification and applications of UAVs are introduced, followed by a description of modelling techniques for quad-rotors and the experimental platform itself. A control strategy for the improvement of attitude stabilization in quad-rotors is then proposed and tested in real-time experiments. The strategy, based on the use low-cost components and with experimentally-established robustness, avoids drift in the UAV's angular position by the addition of an internal control loop to each electronic speed controller ensuring that, during hovering flight, all four motors turn at almost the same speed. The quad-rotor's Euler angles being very close to the origin, other sensors like GPS or image-sensing equipment can be incorporated to perform autonomous positioning or trajectory-tracking tasks. Two vision-based strategies, each designed to deal with a specific kind of mission, are introduced and separately tested. The first stabilizes the quad-rotor over a landing pad on the ground; it extracts the 3-dimensional position using homography estimation and derives translational velocity by optical flow calculation. The second combines colour-extraction and line-detection algorithms to control the quad-rotor's 3-dimensional position and achieves forward velocity regulation during a road-following task. In order to estimate the translational-dynamical characteristics of the quad-rotor (relative position and translational velocity) as they evolve within a building or other unstructured, GPS-deprived environment, imaging, inertial and altitude sensors are combined in a state observer. The text give the reader a current view of the problems encountered in UAV control, specifically those relating to quad-rotor flying machines and it will interest researchers and graduate students working in that field. The vision-based control strategies presented help the reader to a better understanding of how an imaging system can be used to obtain the information required for performance of the hovering and navigation tasks ubiquitous in rotored UAV operation.

Robust Discrete-Time Flight Control of UAV with External Disturbances Springer Science & Business Media

In the last decade the development and control of Unmanned Aerial Vehicles (UAVs) has attracted a lot of interest. Both researchers and companies have a growing interest in improving this type of vehicle given their many civilian and military applications. This book presents the state of the art in

the area of UAV Flight Formation. The coordination and robust consensus approaches are presented in detail as well as formation flight control strategies which are validated in experimental platforms. It aims at helping students and academics alike to better understand what coordination and flight formation control can make possible. Several novel methods are presented: - controllability and observability of multi-agent systems; - robust consensus; - flight formation control; - stability of formations over noisy networks; which generate solutions of guaranteed performance for UAV Flight Formation. Contents 1. Introduction, J.A. Guerrero. 2. Theoretical Preliminaries, J.A. Guerrero. 3. Multiagent Coordination Strategies, J.A. Guerrero, R. Lozano, M.W. Spong, N. Chopra. 4. Robust Control Design for Multiagent Systems with Parametric Uncertainty, J.A. Guerrero, G. Romero. 5. On Adaptive and Robust Controlled Synchronization of Networked Robotic Systems on Strongly Connected Graphs, Y.-C. Liu, N. Chopra. 6. Modeling and Control of Mini UAV, G. Flores Colunga, J.A. Guerrero, J. Escareño, R. Lozano. 7. Flight Formation Control Strategies for Mini UAVs, J.A. Guerrero. 8. Formation Based on Potential Functions, L. García, A. Dzul. 9. Quadrotor Vision-Based Control, J.E. Gomez-Balderas, J.A. Guerrero, S. SALAZAR, R. Lozano, P. Castillo. 10. Toward Vision-Based Coordination of Quadrotor Platoons, L.R. García Carrillo, J.A. Guerrero, R. Lozano. 11. Optimal Guidance for Rotorcraft Platoon Formation Flying in Wind Fields, J.A. Guerrero, Y. Bestaoui, R. Lozano. 12. Impact of Wireless Medium Access Protocol on the Quadrotor Formation Control, J.A. Guerrero, Y. Challal, P. Castillo. 13. MAC Protocol for Wireless Communications, A. Mendez, M. Panduro, O. Elizarraras, D. Covarrubias. 14. Optimization of a Scannable Pattern for Bidimensional Antenna Arrays to Provide Maximum Performance, A. Reyna, M.A. Panduro, A. Mendez.

Robot Control 2003 (SYROCO '03) Springer

This two-volume set (CCIS 158 and CCIS 159) constitutes the refereed proceedings of the International Workshop on Computer Science for Environmental Engineering and Ecolnformatics, CSEEE 2011, held in Kunming, China, in July 2011. The 150 revised full papers presented in both volumes were carefully reviewed and selected from a large number of submissions. The papers are organized in topical sections on computational intelligence; computer simulation; computing practices and applications; ecolnformatics; image processing information retrieval; pattern recognition; wireless communication and mobile computing; artificial intelligence and pattern classification; computer networks and Web; computer software, data handling and applications; data communications; data mining; data processing and simulation; information systems; knowledge data engineering; multimedia applications.

Selected papers from the 2nd International Symposium on UAVs, Reno, U.S.A. June 8-10, 2009 Springer Science & Business Media

This is a comprehensive volume on robot teams that will be the standard reference on multi-robot systems. The volume provides not only the essentials of multi-agent robotics theory but also descriptions of exemplary implemented systems demonstrating the key concepts of multi-robot research. Information is presented in a descriptive manner and augments

Robot Teams Springer Science & Business Media

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.

Adaptive Control of Dynamic Systems with Uncertainty and Quantization MDPI

The past decade has seen tremendous interest in the production and refinement of unmanned aerial vehicles, both fixed-wing, such as airplanes and rotary-wing, such as helicopters and vertical takeoff and landing vehicles. This book provides a diversified survey of research and development on small and miniature unmanned aerial vehicles of both fixed and rotary wing designs. From historical background to proposed new applications, this is the most comprehensive reference yet.

Motion Coordination for VTOL Unmanned Aerial Vehicles 科学出版社

This book reflects the work of top scientists in the field of intelligent control and its applications, prognostics, diagnostics, condition based maintenance and unmanned systems. It includes results, and presents how theory is applied to solve real problems.

Robotic Manipulators and Vehicles Springer Nature

In March 2002, the Naval Research Laboratory brought together leading researchers and government sponsors for a three-day workshop in Washington, D.C. on Multi-Robot Systems. The workshop began with presentations by various government program managers describing application areas and programs with an interest in multi robot systems. Government representatives were on hand from the Office of Naval Research, the Air Force, the Army Research Lab, the National Aeronautics and Space Administration, and the Defense Advanced Research Projects Agency. Top researchers then presented their current activities in the areas of multi robot systems and human-robot interaction. The first two days of the workshop of localization - concentrated on multi-robot control issues, including the topics mapping, and navigation; distributed surveillance; manipulation; coordination and formations; and sensors and hardware. The third day was focused on human interactions with multi-robot teams. All presentations were given in a single-track workshop format. This proceedings documents the work presented by these researchers at the workshop. The invited presentations were followed by panel discussions, in which all participants interacted to highlight the challenges of this field and to develop possible solutions. In addition to the invited research talks, students were given an opportunity to present their work at poster sessions.

Proceedings of the 11th International Conference on Modelling, Identification and Control (ICMIC2019) CRC Press

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.

Autonomous Flying Robots Springer Science & Business Media

The two-volume Proceedings set CCIS 1637 and 1638 constitutes the refereed proceedings of the Third International Conference on Neural Computing for Advanced Applications, NCAAA 2022, held in Jinan, China, during July 8-10, 2022. The 77 papers included in these proceedings were carefully reviewed and selected from 205 submissions. These papers were categorized into 10 technical tracks, i.e., neural network theory, and cognitive sciences, machine learning, data mining, data security & privacy protection, and data-driven applications, computational intelligence, nature-inspired optimizers, and their engineering applications, cloud/edge/fog computing, the Internet of Things/Vehicles (IoT/IoV), and their system optimization, control systems, network synchronization, system integration, and industrial artificial intelligence, fuzzy logic, neuro-fuzzy systems, decision making, and their applications in management sciences, computer vision, image processing, and their industrial applications, natural language processing, machine translation, knowledge graphs, and their applications, Neural computing-based fault diagnosis, fault forecasting, prognostic management, and system modeling, and Spreading dynamics, forecasting, and other intelligent techniques against coronavirus disease (COVID-19).

Formation and Containment Control for High-order Linear Swarm Systems Springer Nature

The International Conference on Intelligent Unmanned Systems 2011 was organized by the International Society of Intelligent Unmanned Systems and locally by the Center for Bio-Micro Robotics Research at Chiba University, Japan. The event was the 7th conference continuing from previous conferences held in Seoul, Korea (2005, 2006), Bali, Indonesia (2007), Nanjing, China (2008), Jeju, Korea (2009), and Bali, Indonesia (2010). ICIUS 2011 focused on both theory and application, primarily covering the topics of robotics, autonomous vehicles, intelligent unmanned technologies, and biomimetics. We invited seven keynote speakers who dealt with related state-of-the-art technologies including unmanned aerial vehicles (UAVs) and micro air vehicles (MAVs), flapping wings (FWs), unmanned ground vehicles (UGVs), underwater vehicles (UVs), bio-inspired robotics, advanced control, and intelligent systems, among others. This book is a collection of excellent papers that were updated after presentation at ICIUS2011. All papers that form the chapters of this book were reviewed and revised from the perspective of advanced relevant technologies in the field. The aim of this book is to stimulate interactions among researchers active in the areas pertinent to intelligent unmanned systems.

UAV or Drones for Remote Sensing Applications Springer Science & Business Media

This two-volume set CCIS 751 and CCIS 752 constitutes the proceedings of the 17th Asia Simulation Conference, AsiaSim 2017, held in Malacca, Malaysia, in August/September 2017. The 124 revised full papers presented in this two-volume set were carefully reviewed and selected from 267 submissions. The papers contained in these proceedings address challenging issues in modeling and simulation in various fields such as embedded systems; symbiotic simulation; agent-based simulation; parallel and distributed simulation; high performance computing; biomedical engineering; big data; energy, society and economics; medical processes; simulation language and software; visualization; virtual reality; modeling and Simulation for IoT; machine learning; as well as the fundamentals and applications of computing.

Applications of Intelligent Control to Engineering Systems Elsevier

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.

Neural Computing for Advanced Applications CRC Press

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.

Methods and Applications for Modeling and Simulation of Complex Systems Springer Science & Business Media

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.

Control Engineering and Information Systems Springer Science & Business Media

Unmanned Aircraft Systems (UAS) have seen unprecedented levels of growth during the last decade in both military and civilian domains. It is anticipated that civilian applications will be dominant in the future, although there are still barriers to be overcome and technical challenges to be met. Integrating UAS into, for example, civilian space, navigation, autonomy, see-detect-and-avoid systems, smart designs, system integration, vision-based navigation and training, to name but a few areas, will be of prime importance in the near future. This special volume is the outcome of research presented at the International Symposium on Unmanned Aerial Vehicles, held in Orlando, Florida, USA, from June 23-25, 2008, and presents state-of-the-art findings on topics such as: UAS operations and integration into the national airspace system; UAS navigation and control; micro-, mini-, small UAVs; UAS simulation testbeds and frameworks; UAS research platforms and applications; UAS applications. This book aims at serving as a guide tool on UAS for engineers and practitioners, academics, government agencies and industry. Previously published in the Journal of Intelligent and Robotic Systems, 54 (1-3, 2009).

Discrete Networked Dynamic Systems Springer Science & Business Media

This book presents a series of innovative technologies and research results on adaptive control of dynamic systems with quantization, uncertainty, and nonlinearity, including the theoretical success and practical development such as the approaches for stability analysis, the compensation of quantization, the treatment of subsystem interactions, and the improvement of system tracking and transient performance. Novel solutions by adopting backstepping design tools to a number of hotspots and challenging problems in the area of adaptive control are provided. In the first three chapters, the general design procedures and stability analysis of backstepping controllers and the basic descriptions and properties of quantizers are introduced as preliminary knowledge for this book. In the remainder of this book, adaptive control schemes are introduced to compensate for the effects of input quantization, state quantization, both input and state/output quantization for uncertain nonlinear systems and are applied to helicopter systems and DC Microgrid. Discussion remarks are provided in each chapter highlighting new approaches and contributions to emphasize the novelty of the presented design and analysis methods. Simulation results are also given in each chapter to show the effectiveness of these methods. This book is helpful to learn and understand the fundamental backstepping schemes for state feedback control and output feedback control. It can be used as a reference book or a textbook on adaptive quantized control for students with some background in feedback control systems. Researchers, graduate students, and engineers in the fields of control, information, and communication, electrical engineering, mechanical engineering, computer science, and others will benefit from this book.

Advances in Unmanned Aerial Vehicles John Wiley & Sons

2019年10月10日出版
 1. 绪论
 2. 无人机的分类与组成
 3. 无人机的飞行原理
 4. 无人机的控制与导航
 5. 无人机的任务规划与调度

Simulation, Modeling, and Programming for Autonomous Robots Springer

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.