Multi Uav Cooperative Surveillance With Spatio Temporal

Platforms, Applications, Security and Services
13th International Conference, ICCCI 2021, Rhodes, Greece, September 29 – October 1, 2021, Proceedings
Distributed Autonomous Robotic Systems
Challenges and Practical Approaches
7th International Conference, ICAIS 2021, Dublin, Ireland, July 19–23, 2021, Proceedings, Part I
13th International Conference, ICIC 2017, Liverpool, UK, August 7-10, 2017, Proceedings, Part I
Proceedings of 2020 International Conference on Guidance, Navigation and Control, ICGNC 2020, Tianjin, China, October 23–25, 2020
Cooperative Control of Multiple Unmanned Aerial Vehicles with Application to Forest Fire Detection and Fighting
In Honour of Dr. G. J. Vachtsevanos
Theory and Applications
Intelligent Computing Theories and Application
Cooperative Networking and Resource Allocation
Advances in Swarm Intelligence
Formation Tracking Control for Heterogeneous Swarm Systems
Multi UAV Systems with Motion and Communication Constraints
Proceedings of the International Conference on Engineering Research and Applications, ICERA 2021
Advanced Missions and Future Use
Distributed Consensus in Multi-vehicle Cooperative Control
Volume 1, Proceedings of the 2015 International Conference on Information Technology and Intelligent Transportation Systems ITITS 2015, held December 12-13, 2015, Xi’an China
Computational Collective Intelligence
Advances in Guidance, Navigation and Control
Unmanned Aerial Vehicles
Intelligent and Fuzzy Techniques in Big Data Analytics and Decision Making
Second International Conference, ADHOCNETS 2010, Victoria, BC, Canada, August 18-20, 2010, Revised Selected Papers
Applications of Intelligent Control to Engineering Systems

9th International Conference, ICSI 2018, Shanghai, China, June 17-22, 2018, Proceedings, Part II
Autonomous Airborne Wireless Networks
Bio-inspired Computation in Unmanned Aerial Vehicles
Intelligent Autonomy of UAVs
Information Technology and Intelligent Transportation Systems
Artificial Intelligence and Security
Ad Hoc Networks
Uninhabited Air Vehicles
Intelligent Autonomy of UAVs
Over 40 Publications / Studies Combined: UAS / UAV / Drone Swarm Technology Research
5th International Conference on Industrial Applications of Holonic and Multi-Agent Systems, HoloMAS 2011, Toulouse, France, August 29-31, 2011, Proceedings
Safe Robot Navigation Among Moving and Steady Obstacles

FLORES PRESTON

Platforms, Applications, Security and Services John Wiley & Sons
This book covers the International Conference on Engineering Research and Applications (ICERA 2021), which took place at Thai Nguyen University of Technology, Thai Nguyen, Vietnam on December 1–2, 2021, and provided an international forum to disseminate information on latest theories and practices in engineering research and applications. The conference focused on original research work in areas including mechanical engineering, materials and mechanics of materials, mechatronics and micromechatronics, automotive engineering, electrical and electronics engineering, information and communication technology. By disseminating the latest advances in the field, the Proceedings of ICERA 2021, Advances in Engineering Research and Application, helps academics and professionals alike to reshape their thinking on sustainable development.

Springer
This book constitutes the refereed proceedings of the 13th International Conference on Computational Collective Intelligence, ICCCI 2021, held in September/October 2021. The conference was held virtually due to the COVID-19 pandemic. The 58 full papers were carefully reviewed and selected from 230 submissions. The papers are grouped in topical issues on knowledge engineering and semantic web; social networks and recommender systems; collective decision-making; cooperative strategies for decision making and optimization; data

mining and machine learning; computer vision techniques; natural language processing; Internet of Things: technologies and applications; Internet of Things and computational technologies for collective intelligence; computational intelligence for multimedia understanding. 13th International Conference, ICCCI 2021, Rhodes, Greece, September 29 – October 1, 2021, Proceedings Closing the Gap Between Research and Field Applications for Multi-UAV Cooperative Missions"The ability to fly multiple unmanned aerial vehicles (UAVs) in collaboration has the potential to expand the scope of feasible UAV missions and could become the backbone of future UAV missions. However, despite having garnered significant research interest, there is no indication that systems supporting collaborative operation of multiple UAVs are close to achieving field deployment. The challenge of successfully deploying a quality system is inherently complex, and systems engineering offers an approach to handle the complexities. Effective application of systems engineering requires both knowledge breadth and depth. This thesis presents the results of a consolidation of information intended to support the conduct of systems engineering activities; and describes an experiment to ascertain the sensitivities of some key operational parameters, e.g., acquisition, pointing, and tracking. The experiment was conducted using Automatic Dependent Surveillance Broadcast (ADS-B) and visual tracking equipment employing state-of-the-art technology to understand the operating challenges and requirements of using this equipment to provide situational awareness for a UAV pilot"--Abstract.Multi UAV Systems with Motion and Communication Constraints
Intelligent Autonomy of UAVs: Advanced Missions and Future Use provides an approach to the formulation of the fundamental task typical to any mission and provides guidelines of how this task can be solved by different generic robotic problems. As such, this book aims to provide a systems engineering approach to UAV projects, discovering the real problems that need to be resolved independently of the application. After an introduction to the rapidly evolving field of aerial robotics, the book presents topics such as autonomy, mission analysis, human-UAV teams, homogeneous and heterogeneous UAV teams, and finally, UAV-UGV teams. It then covers generic robotic problems such as orienteering and coverage. The book next introduces deployment, patrolling, and foraging, while the last part of the book tackles an important application: aerial search, tracking, and surveillance. This book is meant for both scientists and practitioners. For practitioners, it presents existing solutions that are categorized according to various missions: surveillance and reconnaissance, 3D mapping, urban monitoring, precision agriculture, forestry, disaster assessment and monitoring, security, industrial plant inspection, etc. For scientists, it provides an overview of generic robotic problems such as coverage and orienteering; deployment, patrolling and foraging; search, tracking, and surveillance. The design and analysis of algorithms raise a unique combination of questions from many fields, including robotics, operational research, control theory, and computer science.
MDPI
U.S. Air Force (USAF) planners have

envisioned that uninhabited air vehicles (UAVs), working in concert with inhabited vehicles, will become an integral part of the future force structure. Current plans are based on the premise that UAVs have the potential to augment, or even replace, inhabited aircraft in a variety of missions. However, UAV technologies must be better understood before they will be accepted as an alternative to inhabited aircraft on the battlefield. The U.S. Air Force Office of Scientific Research (AFOSR) requested that the National Research Council, through the National Materials Advisory Board and the Aeronautics and Space Engineering Board, identify long-term research opportunities for supporting the development of technologies for UAVs. The objectives of the study were to identify technological developments that would improve the performance and reliability of â€œgeneration-after-nextâ€ UAVs at lower cost and to recommend areas of fundamental research in materials, structures, and aeronautical technologies. The study focused on innovations in technology that would â€œleapfrogâ€ current technology development and would be ready for scaling-up in the post-2010 time frame (i.e., ready for use on aircraft by 2025).

Distributed Autonomous Robotic Systems CRC Press

Unmanned Aerial Vehicle (UAV) technology holds great promise for various civilian and military applications. Cooperative control of a network of autonomous UAVs poses novel challenges because of the inherent constraints like non-holonomic motion, limited range communication, etc. In this dissertation, we present some recently-developed tools and strategies for motion coordination of UAVs. In particular, the focus is on algorithms for various coordination tasks such as vehicle routing to meet service demands, deployment over a region for surveillance and flying in flock-like formations.

Challenges and Practical Approaches SIAM

The Cognitive Approach in Cloud Computing and Internet of Things Technologies for Surveillance Tracking Systems discusses the recent, rapid development of Internet of things (IoT) and its focus on research in smart cities, especially on surveillance tracking systems in which computing devices are widely distributed and huge amounts of dynamic real-time data are collected and processed. Efficient surveillance tracking systems in the Big Data era require the capability of quickly abstracting useful information from the increasing amounts of data. Real-time information fusion is imperative and part of the challenge to mission critical surveillance tasks for various applications. This book presents all of these concepts, with a goal of creating automated IT systems that are capable of resolving problems without demanding human aid. Examines the current state of surveillance tracking systems, cognitive cloud architecture for resolving critical issues in surveillance tracking systems, and research opportunities in cognitive computing for surveillance tracking systems Discusses topics including cognitive computing architectures and approaches, cognitive computing and neural networks, complex analytics and machine learning, design of a symbiotic agent for recognizing real space in ubiquitous environments, and more Covers supervised regression and classification methods, clustering and dimensionality reduction methods, model

development for machine learning applications, intelligent machines and deep learning networks includes coverage of cognitive computing models for scalable environments, privacy and security aspects of surveillance tracking systems, strategies and experiences in cloud architecture and service platform design

7th International Conference, ICAIS 2021, Dublin, Ireland, July 19–23, 2021, Proceedings, Part I John Wiley & Sons

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.

13th International Conference, ICIC 2017, Liverpool, UK, August 7-10, 2017, Proceedings, Part I Springer Nature

The two-volume set of LNCS 10941 and 10942 constitutes the proceedings of the 9th International Conference on Advances in Swarm Intelligence, ICSI 2018, held in Shanghai, China, in June 2018. The total of 113 papers presented in these volumes was carefully reviewed and selected from 197 submissions. The papers were organized in topical sections namely: multi-agent systems; swarm robotics; fuzzy logic approaches; planning and routing problems; recommendation in social media; predication; classification; finding patterns; image enhancement; deep learning; theories and models of swarm intelligence; ant colony optimization; particle swarm optimization; artificial bee colony algorithms; genetic algorithms; differential evolution; fireworks algorithm; bacterial foraging optimization; artificial immune system; hydrologic cycle optimization; other swarm-based optimization algorithms; hybrid optimization algorithms; multi-objective optimization; large-scale global optimization.

Proceedings of 2020 International Conference on Guidance, Navigation and Control, ICGNC 2020, Tianjin, China, October 23–25, 2020 CRC Press

Discover what lies beyond the bleeding-edge of autonomous airborne networks with this authoritative new resource Autonomous Airborne Wireless Networks delivers an insightful exploration of recent advances in the theory and practice of using airborne wireless networks to provide emergency communications, coverage and capacity expansion, information dissemination, and more. The distinguished engineers and editors have selected resources that cover the fundamentals of airborne networks, including channel models, recent regulation developments, self-organized networking, AI-enabled flying networks, and notable applications in a variety of industries. The book evaluates advances

in the cutting-edge of unmanned aerial vehicle wireless network technology while offering readers new ideas on how airborne wireless networks can support various applications expected of future networks. The rapidly developing field is examined from a fresh perspective, one not just concerned with ideas of control, trajectory optimization, and navigation. Autonomous Airborne Wireless Networks considers several potential use cases for the technology and demonstrates how it can be integrated with concepts from self-organized network technology and artificial intelligence to deliver results in those cases. Readers will also enjoy: A thorough discussion of distributed drone base station positioning for emergency cellular networks using reinforcement learning (AI-enabled trajectory optimization) An exploration of unmanned aerial vehicle-to-wearables (UAV2W) indoor radio propagation channel measurements and modelling An up-to-date treatment of energy minimization in UAV trajectory design for delay tolerant emergency communication Examinations of cache-enabled UAVs, 3D MIMO for airborne networks, and airborne networks for Internet of Things communications Perfect for telecom engineers and industry professionals working on identifying practical and efficient concepts tailored to overcome challenges facing unmanned aerial vehicles providing wireless communications, Autonomous Airborne Wireless Networks also has a place on the bookshelves of stakeholders, regulators, and research agencies working on the latest developments in UAV communications.

Cooperative Control of Multiple Unmanned Aerial Vehicles with Application to Forest Fire Detection and Fighting CRC Press

An invaluable addition to the literature on UAV guidance and cooperative control, Cooperative Path Planning of Unmanned Aerial Vehicles is a dedicated, practical guide to computational path planning for UAVs. One of the key issues facing future development of UAVs is path planning: it is vital that swarm UAVs/ MAVs can cooperate together in a coordinated manner, obeying a pre-planned course but able to react to their environment by communicating and cooperating. An optimized path is necessary in order to ensure a UAV completes its mission efficiently, safely, and successfully. Focussing on the path planning of multiple UAVs for simultaneous arrival on target, Cooperative Path Planning of Unmanned Aerial Vehicles also offers coverage of path planners that are applicable to land, sea, or space-borne vehicles. Cooperative Path Planning of Unmanned Aerial Vehicles is authored by leading researchers from Cranfield University and provides an authoritative resource for researchers, academics and engineers working in the area of cooperative systems, cooperative control and optimization particularly in the aerospace industry.

In Honour of Dr. G. J. Vachtsevanos Springer Science & Business Media

This book is a printed edition of the Special Issue "UAV Sensors for Environmental Monitoring" that was published in Sensors

Springer Science & Business Media

This two-volume set of LNCS 12736-12737 constitutes the refereed proceedings of the 7th International Conference on Artificial Intelligence and Security, ICAIS 2021, which was held in Dublin, Ireland, in July 2021. The conference was formerly called “International Conference on Cloud

Computing and Security" with the acronym ICCCS. The total of 93 full papers and 29 short papers presented in this two-volume proceedings was carefully reviewed and selected from 1013 submissions. Overall, a total of 224 full and 81 short papers were accepted for ICAIS 2021; the other accepted papers are presented in CCIS 1422-1424. The papers were organized in topical sections as follows: Part I: Artificial intelligence; and big data Part II: Big data; cloud computing and security; encryption and cybersecurity; information hiding; IoT security; and multimedia forensics

Theory and Applications ProQuest

Multi-robot systems are a major research topic in robotics. Designing, testing, and deploying aerial robots in the real world is a possibility due to recent technological advances. This book explores different aspects of cooperation in multiagent systems. It covers the team approach as well as deterministic decision-making. It also presents distributed receding horizon control, as well as conflict resolution, artificial potentials, and symbolic planning. The book also covers association with limited communications, as well as genetic algorithms and game theory reasoning. Multiagent decision-making and algorithms for optimal planning are also covered along with case studies. Key features: Provides a comprehensive introduction to multi-robot systems planning and task allocation Explores multi-robot aerial planning; flight planning; orienteering and coverage; and deployment, patrolling, and foraging Includes real-world case studies Treats different aspects of cooperation in multiagent systems Both scientists and practitioners in the field of robotics will find this text valuable.

Intelligent Computing Theories and Application Springer

At publication, The Control Handbook immediately became the definitive resource that engineers working with modern control systems required. Among its many accolades, that first edition was cited by the AAP as the Best Engineering Handbook of 1996. Now, 15 years later, William Levine has once again compiled the most comprehensive and authoritative resource on control engineering. He has fully reorganized the text to reflect the technical advances achieved since the last edition and has expanded its contents to include the multidisciplinary perspective that is making control engineering a critical component in so many fields. Now expanded from one to three volumes, The Control Handbook, Second Edition organizes cutting-edge contributions from more than 200 leading experts. The second volume, Control System Applications, includes 35 entirely new applications organized by subject area. Covering the design and use of control systems, this volume includes applications for: Automobiles, including PEM fuel cells Aerospace Industrial control of machines and processes Biomedical uses, including robotic surgery and drug discovery and development Electronics and communication networks Other applications are included in a section that reflects the multidisciplinary nature of control system work. These include applications for the construction of financial portfolios, earthquake response control for civil structures, quantum estimation and control, and the modeling and control of air conditioning and refrigeration systems. As with the first edition, the new edition not only stands as

a record of accomplishment in control engineering but provides researchers with the means to make further advances. Progressively organized, the other two volumes in the set include: Control System Fundamentals Control System Advanced Methods

Cooperative Networking and Resource Allocation MDPI

Since several decades ago, unmanned aerial vehicles (UAVs) have attracted a great deal of attention in academic, industrial and military communities. Recently, multiple cooperative UAVs have been applied in various applications such as forest fire detection and fighting, search and exploration, environmental monitoring and surveillance.The main objectives of this dissertation are to design novel algorithms for single quadrotor UAV trajectory tracking control and multiple UAVs for cooperative/formation control. Then, applying these algorithms in forest monitoring and fire detection application, where a group of detection UAVs is required to surround and track the fire perimeter for monitoring and observation mission. Furthermore, a new algorithm for fault-tolerant cooperative control (FTCC) is proposed, in order to mitigate potential UAV fault effect for reliable and safe mission completion. Finally, a fire fighting algorithm is developed for achieving minimum distances for forest fire UAVs to arrive at their assigned fire spots destinations. A combination of sliding mode control (SMC) and linear quadratic regulator (LQR) is used to design a single quadrotor UAV controller, which is then used to design a formation controller of multiple UAVs. Moreover, another formation controller is designed based on SMC to achieve robust formation control against modeling uncertainties and disturbances.Cooperative UAVs are applied in forest monitoring and fire detection application through three stages: search, confirmation and observation. UAVs are assigned to search for potential forest fires in a certain area, once a fire is detected and a fire alarm will be generated by one or more of the UAVs. The UAVs team then reconfigures its formation by following an elliptic fire perimeter, calculated by the ground station (GS) using a fire spread model. Afterward, the fire alarm confirmation stage begins and all UAVs start evenly distributed for surrounding the fire spot according to the UAVs number in the team. When the fire alarm is confirmed, the observation stage starts and UAVs continue tracking the fire along the fire perimeter. SMC is used to design a formation reconfigurable controller to switch between a predefined formation shape during the search stage, to a dynamic surrounding formation. This controller guarantees even distribution of UAVs surrounding the fire spots and the robustness against disturbances. In addition, task assignment is used with multiple fire spots and multiple UAVs teams in order to reduce the mission execution time. Moreover, the proposed control algorithms are implemented to a team of UAVs paired with a team of unmanned ground vehicles (UGVs), by using these UGVs as a take-off and landing platform in forest monitoring and fire detection application.Meanwhile, UAVs may need to leave formation for refueling/recharging during the mission of search, confirmation and observation, or if a fault occurred during the mission due to fire flames, heat or UAV's internal fault sources. Therefore, an FTCC algorithm is

designed based on the graph theory to mitigate the fault effect on mission completion, and ensure complete surrounding and data gathering of the fire spots using different fire sensors such as infrared cameras, charge-coupled devices (CCD) cameras and thermal cameras etc.Afterward, data gathered during observation stage are processed in the GS, then dangerous fire spots coordinates are sent to the fire fighting UAVs. The leader UAV, the GS or both can perform the task assignment process using an auction-based or Hungarian algorithms to assign each UAV to a fire spot for deploying fire suppressant. Furthermore, a hybrid approach of control parametrization and time discretization (CPTD) and particle swarm optimization (PSO) is proposed to achieve minimum flight distance for each UAV to arrive at its destination, minimizing fuel/battery consumption. Since PSO cannot solve the continuous control inputs, CPTD is used to provide an approximate piecewise linearization of the control inputs. Thus, PSO can be adopted to achieve the global optimum solution.Finally, the proposed algorithms are being implemented on single and multiple quadrotor UAVs in simulations. While, the leader-follower approach is used in cooperative control in a decentralized manner to avoid the disadvantages of centralization. Thereafter, the proposed algorithms are verified on a set of Qball-X4 quadrotor UAVs and QGV unmanned ground vehicles (UGVs) platforms in real-time experiments through different scenarios.

Advances in Swarm Intelligence John Wiley & Sons

A comprehensive review of the state of the art in the control of multi-agent systems theory and applications The superiority of multi-agent systems over single agents for the control of unmanned air, water and ground vehicles has been clearly demonstrated in a wide range of application areas. Their large-scale spatial distribution, robustness, high scalability and low cost enable multi-agent systems to achieve tasks that could not successfully be performed by even the most sophisticated single agent systems. Cooperative Control of Multi-Agent Systems: Theory and Applications provides a wide-ranging review of the latest developments in the cooperative control of multi-agent systems theory and applications. The applications described are mainly in the areas of unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs). Throughout, the authors link basic theory to multi-agent cooperative control practice — illustrated within the context of highly-realistic scenarios of high-level missions — without losing site of the mathematical background needed to provide performance guarantees under general working conditions. Many of the problems and solutions considered involve combinations of both types of vehicles. Topics explored include target assignment, target tracking, consensus, stochastic game theory-based framework, event-triggered control, topology design and identification, coordination under uncertainty and coverage control. Establishes a bridge between fundamental cooperative control theory and specific problems of interest in a wide range of applications areas Includes example applications from the fields of space exploration, radiation shielding, site clearance, tracking/classification, surveillance, search-and-rescue and more

Features detailed presentations of specific algorithms and application frameworks with relevant commercial and military applications Provides a comprehensive look at the latest developments in this rapidly evolving field, while offering informed speculation on future directions for collective control systems The use of multi-agent system technologies in both everyday commercial use and national defense is certain to increase tremendously in the years ahead, making this book a valuable resource for researchers, engineers, and applied mathematicians working in systems and controls, as well as advanced undergraduates and graduate students interested in those areas.

Formation Tracking Control for Heterogeneous Swarm Systems John Wiley & Sons

This book constitutes the refereed proceedings of the 5th International Conference on Industrial Applications of Holonic and Multi-Agent Systems, HoloMAS 2011, held in Toulouse, France, August 29-31, 2011. The 25 revised full papers presented were carefully reviewed and selected from 36 submissions. The papers are organized in topical sections on industrial agents, simulation and modelling, planning and scheduling, smart technical systems, and MAS for unmanned aerial vehicles.

Multi UAV Systems with Motion and Communication Constraints Springer Nature

Covering the design, development, operation and mission profiles of unmanned aircraft systems, this single, comprehensive volume forms a complete, stand-alone reference on the topic. The volume integrates with the online Wiley Encyclopedia of Aerospace Engineering, providing many new and updated articles for existing subscribers to that work.

Proceedings of the International Conference on Engineering Research and Applications, ICERA 2021 Springer Science & Business Media

This book includes the proceedings of the Intelligent and Fuzzy Techniques INFUS 2019 Conference, held in Istanbul, Turkey, on July 23–25, 2019. Big data analytics refers to the strategy of analyzing large volumes of data, or big data, gathered from a wide variety of sources, including social networks, videos, digital images, sensors, and sales transaction records. Big data analytics allows data scientists and various other users to evaluate large volumes of transaction data and other data sources that traditional business systems would be unable to tackle. Data-driven and knowledge-driven approaches and techniques have been widely used in intelligent decision-making, and they are increasingly attracting attention due to their importance and effectiveness in addressing uncertainty and incompleteness. INFUS 2019 focused on intelligent and fuzzy systems with applications in big data analytics and decision-making, providing an international forum that brought together those actively involved in areas of interest to data science and knowledge engineering. These proceeding feature about 150 peer-reviewed papers from countries such as China, Iran, Turkey, Malaysia, India, USA, Spain, France, Poland, Mexico, Bulgaria, Algeria, Pakistan, Australia, Lebanon, and Czech Republic.

Advanced Missions and Future Use Jeffrey Frank Jones

"The ability to fly multiple unmanned aerial vehicles (UAVs) in collaboration has

the potential to expand the scope of feasible UAV missions and could become the backbone of future UAV missions. However, despite having garnered significant research interest, there is no indication that systems supporting collaborative operation of multiple UAVs are close to achieving field deployment. The challenge of successfully deploying a quality system is inherently complex, and systems engineering offers an approach to handle the complexities. Effective application of systems engineering requires both knowledge breadth and depth. This thesis presents the results of a consolidation of information intended to support the conduct of systems engineering activities; and describes an experiment to ascertain the sensitivities of some key operational parameters, e.g., acquisition, pointing, and tracking. The experiment was conducted using Automatic Dependent Surveillance Broadcast (ADS-B) and visual tracking equipment employing state-of-the-art technology to understand the operating challenges and requirements of using this equipment to provide situational awareness for a UAV pilot"--Abstract.