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Note generali	Includes index.
Nota di contenuto	Introduction -- Definitions and Terminology -- Aviation History and Unmanned Flight -- Classification of UAVs -- Military and Civilian UAS/UAVs -- UAV Design Principles: Introduction -- Computational and Experimental Design of a Fixed-Wing UAV -- UAV Handbook: Payload Design of Small UAVs -- Small UAV Design Development and Sizing -- Systematic Design Methodology and Construction of Micro Aerial Quadrotor Vehicles -- Dexterous UAVs for Precision Low-Altitude Flight -- UAV Fundamentals: Introduction -- Kinematics and Dynamics of Fixed-Wing UAVs -- Dynamic Model for a Miniature Aerobatic Helicopter -- Quadrotor Kinematics and Dynamics -- Dynamics and Control of Flapping Wing MAVs -- Dynamic Modeling and Control of an Autonomous Quadrotor -- Sensors and Sensing

Strategies: Introduction -- Sensors for Missions -- Inertial Sensor-Based Simultaneous Localisation and Mapping for UAVs -- UAV Localisation Using Inertial Sensors and Satellite Positioning Systems -- Data Fusion and Tracking with Multiple UAVs -- UAV Propulsion: Introduction -- Power Managements of a Hybrid Electric Propulsion System Powered by Solar Cells, Fuel Cells, and Batteries for UAVs -- UAV Control: Introduction -- Linear Flight Control Techniques for Unmanned Aerial Vehicles -- Nonlinear Flight Control Techniques for Unmanned Aerial Vehicles -- Adaptive Control of Unmanned Aerial Vehicles: Theory and Flight Tests -- Robust and Adaptive Control Methods for Aerial Vehicles -- UAV Communication Issues: Introduction -- Problem of UAV Communications -- Cognitive Networking for UAV Swarms -- Layered Approach to Networked Command and Control of Complex UAS -- Cognitive Radio Architectures for Unmanned Aircraft Systems -- UAV Architectures: Introduction -- HDRC3: A Distributed Hybrid Deliberative/Reactive Architecture for Unmanned Aircraft Systems -- Classification of multi-UAV Architectures -- Operator Interaction with Centralized versus Decentralized UAV Architectures -- UAV Health Management Issues: Introduction -- Integrated Vehicle Health and Fault Contingency Management for UAVs -- Automated Failure Effect Analysis for PHM of UAV -- Prognostics Applied to Electric Propulsion UAV -- Actuator Fault Detection in UAVs -- Experimental Validation of Fault Detection and Diagnosis for Unmanned Aerial Vehicles -- Fault Detection and Diagnosis for NASA GTM UAV with Dual Unscented Kalman Filter -- Fault Diagnosis of Skew-configured Inertial Sensor System for Unmanned Aerial Vehicles -- UAV Modeling, Simulation, Estimation and Identification: Introduction -- Flight Dynamics Modeling of Coaxial Rotorcraft UAVs -- Modeling of a Micro UAV with Slung Payload -- Command and Control of Autonomous Unmanned Vehicles -- MAVs and Bio-Inspired UAVs: Introduction -- Micro Air Vehicles -- Survey of the Human-Centered Approach to Micro Air Vehicles -- Development of Insect-sized MAVs -- Flapping-Wing Propelled Micro Air Vehicles -- Inventing a Biologically Inspired, Energy Efficient Micro Aerial Vehicle -- Issues Surrounding Communications with Micro Aerial Vehicles -- UAV Mission and Path Planning: Introduction -- Cooperative Mission Planning for Multi-UAV Teams -- Multi-team Consensus Bundle Algorithm -- Cooperative Mission and Path Planning for a Team of UAVs -- Cooperative Task Assignment and Path Planning for Multiple UAVs -- On the Decentralized Cooperative Control of Multiple Autonomous Vehicles -- Innovative Collaborative Task Allocation for UAVs -- Control of Communication Networks for Teams of UAVs -- Information-Theoretic Exploration of Unmanned Aerial Vehicle in Unknown Cluttered Environment -- Implementing Dubins Airplane Paths on Fixed-wing UAVs -- Health Monitoring of a Drone Formation Affected by a Corrupted Control System -- UAV Autonomy: Introduction -- Integrated Hardware/Software Architectures to Enable UAVs for Autonomous Flight -- Distributed Optimization of Autonomous UAVs with Event-Driven Communication -- UAV Guidance Algorithms via Partially Observable Markov Decision Processes -- UAV Sense, Detect and Avoid: Introduction -- Development of a Regulatory Safety Baseline for UAS Sense and Avoid -- Achieving Sense and Avoid for Unmanned Aircraft Systems: Assessing the Gaps for Science and Research -- Automatic Traffic Alert and Collision Avoidance System (TCAS) Onboard UAS -- Test Flights to Demonstrate Effectiveness of a Ground-Based Detect and Avoid Integration Concept -- Scalable RADAR-Based Sense-and-Avoid System for Unmanned Aircraft -- Assessment of Detect and Avoid Solutions for Use of Unmanned

Aircraft Systems in Nonsegregated Airspace -- Networked UAVs and UAV Swarms: Introduction -- UAV Swarms: Models and Effective Interfaces -- Decentralized Multi-UAV Coalition Formation with Limited Communication Ranges -- Coordinated Convoy Protection Among Teams of Unmanned Aerial Vehicles -- UAV Routing and Coordination in Stochastic, Dynamic Environments -- UAV Integration into the National Airspace: Introduction -- Aviation Regulation -- Human Factors of Unmanned Aircraft System Integration in the National Airspace System -- Methodologies for Regulatory Compliance and Harmonization -- A Certification Strategy for Small Unmanned Aircraft Performing Nomadic Missions in the US National Airspace System -- Hazard and Safety Risk Modeling -- Safety Risk Management of Unmanned Aircraft Systems -- Certification of Small UAS -- Technology Surveys and Regulatory Gap Analyses of UAS Sub-Systems toward Access to the NAS -- Concept of Operations of Small Unmanned Aerial Systems: Basis for Airworthiness Towards Personal Remote Sensing -- Standards and Certification of a UAS Sense and Avoid Capability -- UAV - Human Interfaces and Decision Support Systems: Introduction -- Human Interfaces in Micro and Small Unmanned Aerial Systems -- Human Factors Perspective on Next Generation Unmanned Aerial Systems -- Cognitive Task Analysis for Unmanned Aerial System Design -- Display and Control Concepts for Multi-UAV Applications -- UAV Operators Workload Assessment by Optical Brain Imaging Technology (fNIR) -- Human Factors and Training: Introduction -- Using Best Practices as a Way Forward for Remotely Piloted Aircraft Operators: Integrated Combat Operations Training-Research Testbed -- From Research to Operations: The PITVANT UAS Training Experience -- UAV Logistics Support: Introduction -- UAV Logistic Support Definition -- UAV Logistics for Life-Cycle Management -- UAV Applications: Introduction -- Survey of Unmanned Aerial Vehicles (UAVs) for Traffic Monitoring -- Measurement and Exploration in Volcanic Environments -- Cooperative Unmanned Aerial Systems for Fire Detection, Monitoring, and Extinguishing -- Selection of Appropriate Class UAS/Sensors to Support Fire Monitoring: Experiences in the United States -- Unmanned Aerial Systems Physically Interacting with the Environment: Load Transportation, Deployment, and Aerial Manipulation -- Unmanned Aircraft Systems for Maritime Operations -- Autonomous Remote Sensing of Invasive Species from Robotic Aircraft -- Cyber-Physical Systems Enabled by Small Unmanned Aerial Vehicles -- Social and Ethical Implications: Introduction -- Ethics and UAVs: Introduction -- International Governance of Autonomous Military Robots -- Moral Case Against Autonomous and SemiAutonomous UAVs -- Moral Case for Autonomy in Unmanned Systems -- Moral Predators: The Duty to Employ Uninhabited Aerial Vehicles -- Killer Robots: Ethical Issues in the Design of Unmanned Systems for Military Applications -- Conclusion: Testimony on Ethical Issues of UAVs for National Academy of Sciences -- Future of Unmanned Aviation.

Sommario/riassunto

The Handbook of Unmanned Aerial Vehicles is a reference text for the academic and research communities, industry, manufacturers, users, practitioners, Federal Government, Federal and State Agencies, the private sector, as well as all organizations that are and will be using unmanned aircraft in a wide spectrum of applications. The Handbook covers all aspects of UAVs, from design to logistics and ethical issues. It is also targeting the young investigator, the future inventor and entrepreneur by providing an overview and detailed information of the state-of-the-art as well as useful new concepts that may lead to innovative research. The contents of the Handbook include material that addresses the needs and ‘know how’ of all of the above sectors

targeting a very diverse audience. The Handbook offers a unique and comprehensive treatise of everything one needs to know about unmanned aircrafts, from conception to operation, from technologies to business activities, users, OEMs, reference sources, conferences, publications, professional societies, etc. It should serve as a Thesaurus, an indispensable part of the library for everyone involved in this area. For the first time, contributions by the world's top experts from academia, industry, government and the private sector, are brought together to provide unique perspectives on the current state-of-the-art in UAV, as well as future directions. The Handbook is intended for the expert/practitioner who seeks specific technical/business information, for the technically-oriented scientists and engineers, but also for the novice who wants to learn more about the status of UAV and UAV-related technologies. The Handbook is arranged in a user-friendly format, divided into main parts referring to: UAV Design Principles; UAV Fundamentals; UAV Sensors and Sensing Strategies; UAV Propulsion; UAV Control; UAV Communication Issues; UAV Architectures; UAV Health Management Issues; UAV Modeling, Simulation, Estimation and Identification; MAVs and Bio-Inspired UAVs; UAV Mission and Path Planning; UAV Autonomy; UAV Sense, Detect and Avoid Systems; Networked UAVs and UAV Swarms; UAV Integration into the National Airspace; UAV-Human Interfaces and Decision Support Systems; Human Factors and Training; UAV Logistics Support; UAV Applications; Social and Ethical Implications; The Future of UAVs. Each part is written by internationally renowned authors who are authorities in their respective fields. The contents of the Handbook supports its unique character as a thorough and comprehensive reference book directed to a diverse audience of technologists, businesses, users and potential users, managers and decision makers, novices and experts, who seek a holistic volume of information that is not only a technical treatise but also a source for answers to several questions on UAV manufacturers, users, major players in UAV research, costs, training required and logistics issues.