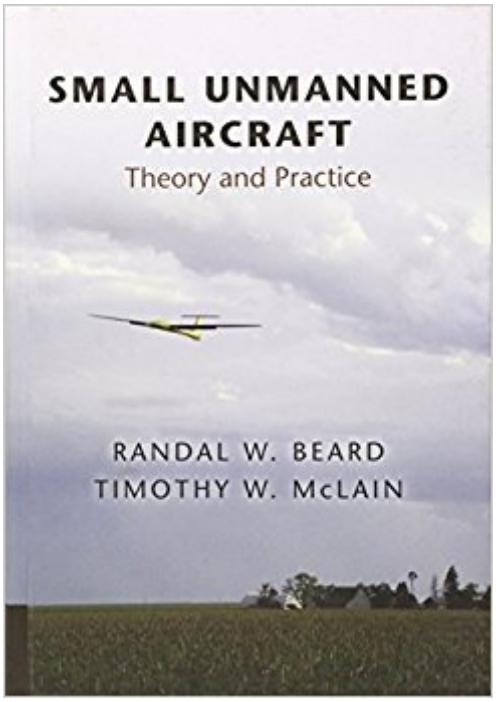
Small Unmanned Aircraft: Theory And Practice



Synopsis

Autonomous unmanned air vehicles (UAVs) are critical to current and future military, civil, and commercial operations. Despite their importance, no previous textbook has accessibly introduced UAVs to students in the engineering, computer, and science disciplines--until now. Small Unmanned Aircraft provides a concise but comprehensive description of the key concepts and technologies underlying the dynamics, control, and guidance of fixed-wing unmanned aircraft, and enables all students with an introductory-level background in controls or robotics to enter this exciting and important area. The authors explore the essential underlying physics and sensors of UAV problems, including low-level autopilot for stability and higher-level autopilot functions of path planning. The textbook leads the student from rigid-body dynamics through aerodynamics, stability augmentation, and state estimation using onboard sensors, to maneuvering through obstacles. To facilitate understanding, the authors have replaced traditional homework assignments with a simulation project using the MATLAB/Simulink environment. Students begin by modeling rigid-body dynamics, then add aerodynamics and sensor models. They develop low-level autopilot code, extended Kalman filters for state estimation, path-following routines, and high-level path-planning algorithms. The final chapter of the book focuses on UAV guidance using machine vision. Designed for advanced undergraduate or graduate students in engineering or the sciences, this book offers a bridge to the aerodynamics and control of UAV flight.

Book Information

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Customer Reviews

"It is very nicely written with a presentation style that engineers in industry will appreciate. Most of

the mathematics involved is very straightforward and the results are presented in a very clear manner. This is a text that should be very useful to those working on unmanned aerial vehicles and may even be of interest to those working on unmanned land or marine vehicles."--Applied Control Technology Consortium

"This book presents a unique and broad introduction to the necessary background, tools, and methods to design guidance, navigation, and control systems for unmanned air vehicles. Written with confidence and authority by leading researchers in the field, this effectively organized book provides an excellent reference for all those interested in this subject."--Emilio Frazzoli, Massachusetts Institute of Technology"Presenting aircraft dynamics to nonaerospace students, this book provides a clear description and explanation for the design of navigation, guidance, and control algorithms for small to miniature unmanned aircraft systems."--Eric W. Frew, University of Colorado, Boulder

Bought this book with high expectations, unfortunately, it’s disappointing on many levels. The level of the material presented is comprehensive enough and broken down into somewhat manageable pieces to follow along. The biggest downfall of the book is the many typos/errors and insufficient clarification on examples. The website makes a poor attempt at helping readers with the many errors. The website also includes a section for users to comment and request feedback but the authors refuse to provide any feedback or updates. There are many concepts that are mentioned in the book on a very superficial level and the authors do a very poor job at providing the correct amount of detail, some of the solutions to the equations seems to appear out of the blue as if by magic. It would be nice if the authors at least made an attempt to respond to reader’s concerns, especially since we’re the ones buying their books.

This is a great resource for anyone that works with small UAS (heck this is really useful for any work with unmanned aircraft, a lot of the principles are universally applicable). Beard and McLain do a great job breaking down their algorithms step by step. Even if you have to search around for the meaning of a variable it is usually in the appendix or some other convenient place. There are some methods in the book that lack explanation on some of the smaller details, so for those situations I would refer you to their website. They have a lot of sample code that you can use and I found that reading through their m-code helped fill in some of the holes in the explanations in the book.

This was the textbook for my Autonomous Robotic Systems course. With the help of the professor we used the concepts in this book to make Matlab and Simulink simulations to rotate and translate simple 3D models of vehicles, create waypoint navigation algorithms, animate the dynamics of applied moments and forces, and create an autonomous control system for a quad-copter. For those who aren't in a college course that uses this book, the website for the book has Matlab and Simulink files so that you can work on similar projects. The book is incredibly helpful for understanding the theory, and the Appendices have great examples of Matlab code for vehicle plotting/animating, translation, rotation, and the creation of S-Functions to make your own Simulink blocks.Background knowledge in differential equations, dynamic systems, Matlab, and Simulink is required if you want to learn this stuff effectively.

Thebook was good, but the key lied in the exercises and supplementary material. Without the additional projects, the book is slightly difficult to comprehend. A backgound in kinematics, linear algebra and differential equations, Simulink control systems, and aircraft structures would help readers. One gripe, was that lecture slides online had some errata compared to book figures and equations; my suggestion would be to use the most current document.

This book discusses the topics of UAV automatic flight control.The title might be misleading.The book should be called "Automatic flight control of Small Unmanned Aircraft".The book doesn't cover any other aspects of UAV design except the flight control.The text is easy to read despite the math.Good book, clean explanations.

It is a great introduction book. There are a lot of examples, and the maths are easy to follow. However, there are a lot of small error in the book, which is listed on their website.

The book provides a smooth sequential approach from theory to implementation.What I like most is the MATLAB implementations accompanying the book, which helps enforcing the knowledge and improving simulation skills. However, there are some typos that should be corrected in subsequent editions.

Great book. Easy to understand as it steps you from basic UAV systems all the way up to a fairly involved simulator system. Refer to it regularly in my PhD work.

Small Unmanned Aircraft: Theory and Practice The World Encyclopedia of Aircraft Carriers and Naval Aircraft: An Illustrated History Of Aircraft Carriers And The Naval Aircraft That Launch From ... Wartime And Modern Identification Photographs Small Unmanned Aircraft Systems Guide: Exploring Designs, Operations, Regulations, and Economics Remote Pilot sUAS Study Guide: For applicants seeking a small unmanned aircraft systems (sUAS) rating (FAA Handbooks series) Remote Pilot Test Prep - UAS: Study & Prepare: Pass your test and know what is essential to safely operate an unmanned aircraft – from the most trusted source in aviation training (Test Prep series) Remote Pilot Test Prep 2018: Study & Prepare: Pass your test and know what is essential to safely operate an unmanned aircraft – from the most trusted source in aviation training (Test Prep Series) Unmanned Aircraft in the National Airspace: Critical Issues, Technology, and the Law Drones: An Illustrated Guide to the Unmanned Aircraft that are Filling Our Skies Designing Unmanned Aircraft Systems: A Comprehensive Approach, Second Edition (AIAA Education Series) Drones in Society: Exploring the strange new world of unmanned aircraft Allied Aircraft Piston Engines of World War II: History and Development of Frontline Aircraft Piston Engines Produced by Great Britain and the united (Premiere Series Books) Composite Construction for Homebuilt Aircraft: The Basic Handbook of Composite Aircraft Aerodynamics, Construction, Maintenance and Repair Plus, How-To and Design Information The Photo book of Aircraft. Selected images of classic & vintage planes, cockpits, helicopters, commercial, stunt and military aircraft. (Photo Books 5) Aircraft Dispatcher Oral Exam Guide: Prepare for the FAA Oral and Practical Exam to Earn Your Aircraft Dispatcher Certificate (Oral Exam Guide series) Flight Radio - US Aircraft Frequency Guide - 2017-2018 Edition: Guide to listening to Aircraft Communication on your Scanner Radio Classic Military Aircraft: The World’s Fighting Aircraft 1914-1945 The Best Advanced Paper Aircraft Book 3: High Performance Paper Airplane Models plus a Hangar for Your Aircraft The Soviet/ Russian Aircraft Carriers: The Aircraft Carriers of the World Volume 4 Structural Loads Analysis for Commercial Aircraft: Theory and Practice (American History Through Literature) Fluid, Electrolyte, and Acid-Base Disorders in Small Animal Practice, 4e (Fluid Therapy In Small Animal Practice)