Introduction to UAV Systems

Fourth Edition

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Unmanned Aerial Vehicles (UAVs) have been widely adopted in the military world over the last decade and the success of these military applications is increasingly driving efforts to establish unmanned aircraft in non-military roles.

Introduction to UAV Systems, Fourth Edition provides a comprehensive introduction to all of the elements of a complete Unmanned Aircraft System (UAS). It addresses the air vehicle, mission planning and control, several types of mission payloads, data links and how they interact with mission performance, and launch and recovery concepts. This book provides enough information to encourage a student to learn more; to provide a specialist with a basic appreciation of the technical issues that drive other parts of the system and interact with their specialty; or to help a program manager understand system-level tradeoffs and know what questions to ask.

Key features:
- Comprehensive overview of all elements of a UAS and of how they interact.
- Introduces the underlying concepts of key subsystems.
- Emphasizes system-integration issues and how they relate to subsystem design choices.
- Practical discussion of issues informed by lessons learned in UAV programs.

Introduction to UAV Systems, Fourth Edition is written both for newcomers to the subject and for experienced members of the UAV community who desire a comprehensive overview at the system level.

As well as being a primary text for an introductory course on UAVs or a supplementary text in a course that goes into more depth in one of the individual technologies involved in a UAS, this book is a useful overview for practicing engineers, researchers, managers, and consultants interested in UAV systems.
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This book is dedicated to our wives, Beverly Ann Evans Fahlstrom and Archodessia Glyphis Gleason, who have provided support and encouragement throughout the process of its preparation.
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# Classes and Missions of UAVs

## Overview

### Examples of UAV Systems

- **Very Small UAVs**
- **Small UAVs**
- **Medium UAVs**
- **Large UAVs**

## Expendable UAVs

## Classes of UAV Systems

- **Classification by Range and Endurance**
- **Informal Categories of Small UAV Systems by Size**
- **The Tier System**
- **Another Classification Change**

## Missions

## Reference

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# Part Two  The Air Vehicle

## Basic Aerodynamics

- **Overview**
- **Basic Aerodynamic Equations**
- **Aircraft Polar**
- **The Real Wing and Airplane**
- **Induced Drag**
- **The Boundary Layer**
- **Flapping Wings**
- **Total Air-Vehicle Drag**
- **Summary**

## Performance

- **Overview**
- **Climbing Flight**
- **Range**
  - **Range for a Propeller-Driven Aircraft**
  - **Range for a Jet-Propelled Aircraft**
- **Endurance**
  - **Endurance for a Propeller-Driven Aircraft**
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