



# Drone Development from Concept to Flight : Design, Assemble, and Discover the Applications of Unmanned Aerial Vehicles

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Monografía

Learn the principles behind building and flying drones, using components like BLDC motors and speed controllers, AeroGCS ground software, Ardupilot and PX4 open-source flight stacks, along with examples and best practices

**Key Features**

- Explore multicopter physics (roll, pitch, and yaw) and 3D dynamics for defining a drone's flight
- Optimize drone performance with powerful propulsion systems such as BLDS motors, lipo batteries, and ESCs
- Build a custom survey drone to learn vital aspects of drone assembly, configuration, testing, and maiden flight

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**Book Description**

Unlock opportunities in the growing UAV market where drones are revolutionizing diverse sectors like agriculture, surveying, and the military. This book walks you through the complete drone development life cycle, from concept to pilot stage, prototyping, and ultimately, a market-ready product, with domain-specific applications. Starting with an introduction to unmanned systems, principles of drone flight, and it's motion in 3D space, this book shows you how to design a propulsion system tailored to your drone's needs. You'll then get hands on with the entire drone assembly process, covering airframe, components, and wiring. Next, you'll enhance drone connectivity and navigation with communication devices, such as RFD900, Herelink, and H-16 Pro GCS and hardware protocols like I2C, and UART. The book also guides you in using the open-source flight software Ardupilot and PX4, along with firmware architecture and PID tuning for advanced control. Additionally, you'll go learn about AeroGCS, Mission Planner, and UGCS ground control stations, tips for maiden flight and log analysis for optimizing performance while building a custom survey drone with a 60-min endurance, 10km range, live video feed, and photography options. By the end of this book, you'll be equipped with all you need to build and fly your own drones and UAVs.

**What you will learn**

- Explore the design principles for multicopter flight and its physics of motion
- Grasp terminologies associated with UAV flight systems
- Gain an in-depth understanding of power trail, communication, and propulsion of a drone
- Study IMUs and sensors in flight controllers, and protocols like I2C, SPI, and MAVlink
- Familiarize yourself with open-source drone flight stacks and ground control station software
- Understand the control law used in multicopter and the basics of PIDs
- Delve into modes of flying with remote controllers and analysis of flight logs

**Who this book is for**

This book is for beginner-level drone engineers, robotics engineers, hardware and design engineers, and hobbyists who want to enter the drone industry and enhance their knowledge of the physics, mechanics, avionics, and programming of drones, multicopters, and UAVs. A basic understanding of circuits, assembly, microcontrollers, and electronic instruments like multimeter and batteries, along with fundamental concepts in physics and mathematics, will be helpful for reading this book

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