

Preface

An aerial robot is a system capable of sustained flight with no direct human control and able to perform a specific task. A lighter than air robot can also be defined as a lighter than air unmanned aerial vehicle or an unmanned airship with sufficient autonomy. Lighter than air systems are particularly appealing since the energy to keep them airborne is small. To provide autonomy to the aerial vehicles requires the development of methods to conducting and decisions for implementing the various operations of a mission. Guidance and control for lighter than air robots involve significant differences from traditionally defined mobile robots. Qualities characteristics to lighter than air robots include non trivial dynamics with added masses and inertias, 3D environments, disturbed operating conditions and high level of uncertainty in state knowledge and environment. Otherwise, they share qualities with typical robotic problems including partial knowledge of the environment and tasks that can be precisely specified or not. These tasks can involve continuous interaction with the environment.

The purpose of this book is to familiarize the readers with some planning and control strategies that have been proven efficient through research. It is made of a hierarchy of modules with well defined functions operating at a variety of rates, linked together from top to bottom. The outer loop, closed periodically, consists of a discrete search that produces a set of waypoints leading to the goal while avoiding obstacles and weighed regions. The second level smoothes this set so that the generated paths are feasible and the last one is the tracking controller that attempts to minimize the error between the robot measured trajectory and the reference trajectory.

This hierarchy conveys to the content of the book: Modeling, Mission Planning, Trajectory Design and Control.

Paris, France

Yasmina Bestaoui Sebbane

Lighter than Air Robots
Guidance and Control of Autonomous Airships
Bestaoui Sebbane, Y.
2012, XVIII, 254 p., Hardcover
ISBN: 978-94-007-2662-8