

Preface

Small spacecraft, in particular CubeSats, gained significant popularity during the past decade [1]. While space exploration actually began with a small spacecraft (Sputnik [2]), it was only recently that electronics miniaturization and other factors enabled small spacecraft to perform (or even be considered for) missions that were once the domain of much larger spacecraft. A recent news feature in *Science* [3] contrasted the data collected by a PlanetLabs 10 cm × 10 cm × 30 cm CubeSat and a much larger Landsat spacecraft. Aside from some clouds (the images were taken at different times), the two are virtually indistinguishable. While it would be inaccurate to suggest that small spacecraft can duplicate the capabilities of larger ones in all ways, it is clear that their utility for many applications has been demonstrated.

Despite the value that has been demonstrated to students (see chapter 10) who participate in small spacecraft programs and the research and other capabilities that these spacecraft have provided, very little has been written about the logistics of starting and evaluating a small spacecraft program. Due to this, key questions remain undiscussed. These include what factors should one consider in deciding to start a small spacecraft program, what factors should influence a build vs. buy decision, and how does one evaluate the success of a small spacecraft program. This book seeks to begin to answer some of these questions.

Due to the nature of academic publishing, this book is designed to be read in two ways. The first is as a traditional book: one can start at the beginning and read through areas of interest (skipping and possibly returning to some sections as needed). Many readers, however, may choose to read just a single or small number of chapters. The availability of individual chapters for download (and purchase) via SpringerLink requires that we not assume readers will have read—or even have access to—prior or subsequent chapters. For this reason, a certain amount of background information, required to provide context for the current chapter, is included. Those reading the book straight through will find most of this material presented (in more detail) in Chap. 1 and may wish to skip the background sections in subsequent chapters.

We don't pretend to suggest that the approaches discussed and metrics used in this book are the only ways to start or evaluate a small spacecraft program. In fact, we hope that this work contributes to an ongoing discussion in some areas and starts one in others. We look forward to expanding on this work in the future based on the results of that discussion.

References

1. Swartwout, M. 2014. The first one hundred CubeSats: A statistical look. *Journal of Small Satellites* 2: 213–233.
2. Dickson, P. 2001. *Sputnik: The Shock of the Century*. New York, NY: Walker Publishing Company, Inc.
3. Hand, E. 2015. Startup liftoff. *Science* 348(6231): 172–177. doi:10.1126/science.348.6231.172.

Small Spacecraft Development Project-Based Learning
Implementation and Assessment of an Academic
Program

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2017, XII, 231 p. 67 illus., 62 illus. in color., Hardcover

ISBN: 978-3-319-23644-5