

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
New Worlds - Non-Traditional Space Education and Outreach (7)

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SMALLSATS FOR AMATEURS: A GUIDE FOR K-12 EDUCATORS, UNIVERSITY STUDENTS,  
PROFESSORS AND NEW SPACE ACTORS

**Abstract**

The smallsat revolution is well underway transforming the users and the applications of Earth orbit. Between the miniaturization of advanced technologies, commoditization of spacecraft manufacturing, and declining costs of launch, spaceflight is quickly becoming democratized and accessible to a wider field of new participants, including small businesses, nonprofits, teachers and students.

This new breed of satellites can offer services and benefits that were before reserved only for governments and large corporations, enabling applications from elementary school science projects to crisis monitoring tools. However, despite lower cost and complexity, new space actors must still abide by the same protocols and procedures as experienced space programs, requiring proper education and instruction to responsibly participate in space activities

This handbook intends to close that knowledge gap for several different levels of experience and with special emphasis on regulation, licensing and responsible design. It also provides methods of engagement and the development of project management skills and engineering concepts involved without actually launching to orbit. The handbook is structured into four main chapters, which provide a broad understanding of how to design, develop, and operate a small satellite:

1) an introduction and discussion on the benefits of small satellites as an educational tool 2) mission design, resource management and basics of construction 3) regulatory compliance and launch 4) ongoing operations, as well as appendices for flowcharts and additional resources.

This guide has been created through the first-hand experience of graduate students involved in the management, engineering and regulatory compliance activities related to the launch of George Washington University's GW-Sat, the first satellite built in Washington, DC. The documentation of this experiential learning is supplemented with extensive literature review and interviews with senior-level industry personnel, government officials, engineers and other members of the smallsat community.