

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
On Track - Undergraduate Space Education (3)

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FROM THE CLASSROOM TO SPACE: TRAINING THE NEXT GENERATION OF SPACE  
ENGINEERS WITH THE SABRE CUBESAT PLATFORM

**Abstract**

Like many university research labs, the Space Systems Group (SSG) at the University of Florida is a revolving door: researchers frequently come and go. Veteran members leave with their vast sets of knowledge and experience. This knowledge and experience is difficult to pass on to the next generation of lab-goers. Like the United Nations Basic Space Technology Initiative (UNBSTI) and other institutional education programs, the SABRE platform began as a hands-on idea to address this challenge. SABRE-I, the first iteration of the SABRE platform, was designed to facilitate an end-to-end hands-on spacecraft design experience (i.e. conceptualize, design, fabricate, operate, and decommission), providing an opportunity for veteran SSG members to showcase many aspects of the space mission design process to newer members. SABRE-I closely represents CubeSat-class systems with significantly less cost reduced due to the use of commercial off-the-shelf (COTS) hobbyist parts. Moreover, SABRE-I followed a rigorous systems engineering design process that culminated in a successful high altitude balloon launch of the platform in early 2015.

The success of SABRE-I led to the platform being implemented as a part of a capstone design course in the Department of Mechanical and Aerospace Engineering at the University of Florida (UF) in Fall 2015. In this course, undergraduate students gained hands-on experience with successfully launched missions centered around the SABRE platform. Furthermore, SABRE-I was used as an outreach tool to demonstrate science, technology, engineering, and mathematics (STEM) concepts to middle school students through the Educate Utilizing CubeSat Experience (EdUCE) program, a K-20 STEM education program using space-derived activities with an emphasis on design and development of CubeSats.

The SABRE platform was further developed and matured as SABRE-II in another capstone design course in the Department of Electrical and Computer Engineering at UF in Spring 2016 by incoming SSG lab members. SABRE-II addressed some of the lessons learned from SABRE-I and improved on the design with newer COTS components and design processes.

The SABRE platform continues to mature and various design modules have been utilized by the other organizations (i.e., SwampSat II, CHOMPTT, WeissSat-1). This paper provides an overview of the SABRE design process, how each iteration SABRE has further developed the platform, and the lessons learned during the development and utilization of the system. Furthermore, this paper showcases various design modules that may be incorporated to future emerging CubeSat-class satellite projects for a broad educational spectrum.