SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Lift Off - Secondary Space Education (2) (2B)

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THE MIDWESTERN USA CUBESAT HIGH SCHOOL OUTREACH PROGRAM

Abstract

The Midwestern USA CubeSat High School Outreach Program allows students to get experience in spacecraft design and construction while they are still in high school. North Dakota State University, through this program, has been helping regional high schools start their own CubeSat projects. In these projects, students assemble their own satellites, which will eventually be launched into orbit, and design and develop payloads for them.

This paper provides an overview of this program and the work of the schools participating in it. It also discusses the educational benefits provided by the program and the correlation between program activities and the educational benefit produced.

There are multiple high schools throughout the Midwest United States involved in the program. They range from schools that are currently performing assembly and testing to schools that are just beginning the process. From the perspective of the student participants, they gain both an educational experience (including a chance to 'touch space') as well as participating in something that looks great on a college application or resume. Participating students also gain design, development, testing and project management skills that can put them ahead of their peers in college or the workforce. The school benefits from having an inspirational science, technology, engineering and math (STEM) activity that has little or no cost to the school.

The students are given all of the components necessary to build a basic Open Prototype for Educational Nanosats (OPEN) framework-based CubeSat. This includes a flight computer, electrical power system, payload computer processing board and amateur band radio. The components are mounted on the boards by the students and the boards are tested. They then assemble the boards into the CubeSat frame and test the integrated satellite. Schools have the option of designing a payload or including a camera (or, space allowing, both).

This approach gives the students a likely-to-work satellite, while also providing an opportunity to go through the structured design process. The boards are provided to the schools and students one at a time, to facilitate maintaining focus. The board fabrication is completed before students get significantly involved in payload design. For this, they need to use their creativity and ingenuity to put something inside their satellite worth orbiting the planet. The combination of structured and unstructured activity teaches the students valuable engineering processes while still encouraging creative thinking.