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EMPOWERING THE NEXT GENERATION OF SATELLITE ENGINEERS: A SCALABLE MODEL FOR HANDS-ON SPACE EDUCATION

Abstract

While some higher-level courses in space engineering exist within Norwegian universities, there are limited opportunities for early undergraduate students to explore their passion for space engineering. It is crucial to engage enthusiastic students to provide for the development of Norway's future space workforce. Therefore, the student organization Orbit NTNU offers first-year students a year-long satellite development project through its Sub-Orbital program. The project culminates in a high-altitude balloon launch. Orbit NTNU is a volunteer student organization that builds and operates satellites from Trondheim, Norway.

The Sub-Orbital program emphasizes student involvement and mentorship. Students take ownership of the entire balloon's development process, working through distinct mission phases that mirror Orbit NTNU's workflow for satellite projects. This structured approach highlights the iterative nature of satellite design and encourages a supportive learning environment. Every year, the new team selects and designs their mission, such as this year's emphasis on building a fluxgate sensor and measuring Earth's magnetic field. Through hands-on courses organized by experienced Orbit mentors, independent research, and cross-team collaboration, they gain experience in hardware design, software programming, and sensor integration.

The program's success is evident by positive student feedback and former Sub-Orbital participants' continued engagement with Orbit. We continuously gather feedback through surveys, focus groups, and alumni interviews to ensure the Sub-Orbital project's ongoing impact. Our adaptable project model focuses on early-stage skill development, student ownership, and mentorship, offering a valuable approach to empowering the next generation of aerospace engineers worldwide.

In this paper, we explore how to empower the next generation of aerospace engineers through student ownership, mentorship, and early-stage skill development. By allowing students to build their weather balloons with affordable, non-specialized equipment, the model is adaptable to diverse universities and student organizations, offering insights into the broader aerospace industry.