50th STUDENT CONFERENCE (E2)
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IMPLEMENTATION OF A TAILORED MISSION ANALYSIS FRAMEWORK FOR THE FRAMSAT-1 CUBESAT MISSION

Abstract

Orbit NTNU is a volunteer student organization specializing in uniting industry and cooperation to utilize further and build new space. Making nanosatellites adaptable payloads has become a crucial part of new space, and Orbit NTNU is further specializing in this field. The organization allows students to design, build and launch satellites with hands-on experience. By cooperating with industry and integrating tech demonstrators into their missions, they take a unique position that takes advantage of students' volunteer hours and holds them to an industry standard.

After the first satellite was initiated in 2018, Orbit NTNU began to develop its subsystems to develop a bus. This was developed with an internal chosen payload to engage both students and the public. At the end of the development phase, a second new satellite was initiated to seek industry partnerships and further extend the possibilities of Orbit NTNU. By making the self-developed bus accessible to the industry with volunteer hours, new payloads and systems can be tested and developed for space applications at minimal costs, further extending the accessibility of space. Higher risks can be accepted at lower prices, which causes further innovations.

Due to this being driven by a student initiative, launch providers such as ISAR have promised to launch our satellites free of charge, further increasing our possibilities. This paper will provide further details of how industry payloads can be integrated and tested by a volunteer student organization and lessons learned from FRAMSAT-1. The cooperation with industry partners has created a relationship that has challenged our user interface documents while giving further insight into the risks and freedom associated with a mission solely built and operated by students. Orbit NTNU has integrated the payload into their self-developed bus and architecture with a team of 10 people contributing 15 hours a week per person over one year. The analysis will explain how the payload was integrated and how the interfaces were designed. The payload was demanding a partial redesign of our attitude determination and control system to fit into the bus while still completing its mission objectives. This analysis further explains how these challenges were addressed and how the student organization implemented solutions that met the mission while complying with the industry standard set by the partner.