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SOFTWARE DEVELOPMENT LESSONS LEARNED IN VOLUNTEER STUDENT-DRIVEN CUBESAT MISSIONS

Abstract

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Software Development Lessons Learned in Volunteer Student-Driven CubeSat Missions

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1 Abstract

Orbit NTNU is a volunteer student organization which aims to give space-motivated students practical experience in satellite design. This is achieved though the development of several Cubesat projects.

This paper will quickly summarize the software architecture of the On-Board Computer (OBC) software, which is one of the three in-house built components of the satellite bus. The flight-software contains 1) a boot loader, 2) a Cubesat Space Protocol network stack implementation, 3) a housekeeping program 4) a ground station interface, and finally 5) two file transfer protocol implementations. The summary will serve as a basis to understand some of the discrepancies present in the design.

From the project's start in 2018 until its launch in 2022, there have been many challenges related to software development. The constant turnover and internal change of positions in the organization, in addition to new members' lack of experience in the field of embedded software, has lead to discontinuous software implementation. Furthermore, previous work has been modified and even erased due to widely different ideas of software architecture. Finally, a worrisome trend is the organization's reliance on a slight few that hold much of the software implementation details.

To combat these issues, Orbit NTNU focuses on 1) communication within and across technical teams, 2) teaching its new members both embedded software and software development workflow, 3) providing reviewed documentation on software architecture before implementation, and finally 4) continuous code reviews between software developers.