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SOFTWARE DEFINED PAYLOAD HANDLING UNIT FOR SHARED SMALL SATELLITE MISSIONS
FOR IN-ORBIT-DEMONSTRATION

Abstract

Nowadays CubeSats offer a novel, rapid and cost-effective approach to IOV/IOD missions as the solutions are heavily based on COTS materials and systems. Due to the CubeSat form factor, frequent launch opportunities are available, allowing for a significant reduction of the time needed to prepare CubeSat based missions. CubeSat platforms decrease the cost of IOV/IOD missions by orders of magnitude as well as significantly decrease turn-around times compared to classic missions which take significantly more resources to develop.

Recently German Orbital Systems GmbH has proposed the GROOVE EVO platform, which is optimized for In Orbit Demonstration (IOD) mission through interface optimization and optimal scheduling between payloads. The concept is built on a 6U CubeSat basis, which is shared between up to 20 customers. 4U of free space can be dedicated to various configurations of payloads from simple sensors to advanced telescopes or propulsion modules. The innovative solutions allow flexible payload handling while maintaining generic satellite architecture. Software defined capabilities of platform in terms of power and data interfaces, advanced attitude control approach using new types of actuators, dedicated interface managers for each payload and autonomous payload scheduler – these are some of the unique solutions which differ the proposed platform from existing IOD dedicated satellites.

The objectives of this project are driven by the shortcomings of the current state-of-the-art IOD services, feedback from customers, experience from previous missions as well as by the results of de-risk activity. In the scope of the project, a new design of an independent Payload Handling Unit with high power capabilities and broad set of data interfaces suitable for installation in the small satellite platform is proposed. Besides that, software solutions for flexible payload data handling are designed and verified with a set of possible payloads. Finally, the capabilities of developed module to successfully support the operations of number of IOD payloads and deliver the associated payload data are demonstrated. At the end of the project, among others, new Payload Handling Unit concept was verified with a set of existing and potential customers.