SPACE SYSTEMS SYMPOSIUM (D1)
Hosted Payloads - Concepts, Techniques and Challenges, Missions and Applications (7)

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AN EFFICIENT DESIGN AND INTEGRATION TECHNOLOGY FOR CUBESAT PAYLOAD

Abstract

In the end of 2014, Shanghai Engineering Center for Microsatellites (SECM) kicked off an ambitious mission, in which three different CubeSats (called STU-2A, B, C respectively) were planned to be developed in one year to carry multiple payloads for in-orbit experiment. The main tasks and objectives of this mission are space observation, data collection, inter-space communication and formation flying at different life stages of the three CubeSats. In STU-2C, a System on Chip (SoC) GPS/BD2 receiver, an inertial sensor and an in-house made magnetometer are in the plan. It's an interesting explore to test the performance of the above three terrestrial components in-orbit and probe into their potential usage for CubeSat missions. The idea to carry multiple payloads in one space mission will produce a lot of advantages, like risk reducing, cost saving and mission value attaching. However, unexpected challenges will also come during the process, covering system design, customized payload design, components layout, specific experiment, integration and comprehensive testing. Also, the limited developing time makes the mission more difficult since any mistake in the processing of design or integration may have no change to make up. On the other hand, interdependence of systems is a major challenge for a space engineering project, for that changing the aspects of one system could force design changes in other systems as well. Significant of work has been done to carry above payloads in STU-2C and the factor of many sides in the system has been properly considered in advance. It's also worth mentioning that experimental result and simulation analysis was fully utilized to guide the engineering implementation during the mission and tremendously help speeding up the project. On 25th Sept. 2015, STU-2C, along with STU-2A and STU-2B, has been successfully launched into the expected SSO orbit at 481km by piggy-backing the Long March 11 in Jiuquan, China. The CubeSat is undergoing the in-orbit commissioning phase, with a good health status. Technology to design and integation the above different payloads on STU-2C to help the mission move on in a fast and efficient way is discussed in the paper. Some analysis of in-orbit result is presented and lessons learned are also concluded.