

SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

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ASSESSING NANOSATELLITE FLIGHT & GROUND SOFTWARE FRAMEWORK TO NASA & ESA
SOFTWARE SAFETY STANDARDS

Abstract

Recent Surrey Space Centre missions have demonstrated a new software design and implementation process that has been validated on both flight and ground segment software chains. Our new common software framework allows for concurrent development in multiple fast timeline nanosatellite missions using open-source FreeRTOS embedded and enterprise PostgreSQL and php tools. We exploit overlapping and common functions for flight code that is automatically generated into ground segment databases. This tool has provided advanced debugging support during system end-to-end test (SEET) and in student and staff training operations. In contrast with classical validation and requirements waterfall processes found in large space organisations, a small team has delivered new user and goal focussed flight software (FSW) and mission control software (MCS) capabilities.

This paper analyses and discusses the AlSat-1N implementation of the FSW and MCS by interrogating our database that contains all the pre-launch development and test data, and also over 120 days of post-launch operations. This enables us to quickly understand and compare the level of validation that was achieved relative to safety standards, such as NASA-STD-8719.13C and ECSS-Q80B. As university missions become more capable, varying degrees of software compliance now exist and new methods are being proven outside of these established standards. We explore what qualitative and quantitative comparisons can be made using our FSW and MCS tools, if and how flight validation is considered, and what new common practices the community could follow towards low cost or 'lean' satellite missions.