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PLUG-AND-FLY SPIN-2 MISSION

Abstract

MA61C-CubeSat is a command and data-handling (CDH) system developed by Space Products and Innovation (SPiN), designed as a robust onboard computer (OBC) or as an adaptable payload controller for satellite missions. Its hardware architecture consists of a processing block, a memory block, a timing block, and an interface block, which are engineered to ensure reliable operation in extreme space environments. The software of the MA61C-CubeSat is highly adaptable, which makes it easy to add new device drivers and communication protocols. This capability is achieved using an Electronic Data Sheet (EDS) defined in JSON format, enabling the software to describe operational parameters and configuration settings for connected subsystems. The plug-and-play nature of the software allows the system to automatically recognise newly attached devices and assign the appropriate EDS, thereby streamlining the assembly, integration, and testing (AIT) process and reducing potential human error. This modular and adaptive approach accelerates the development cycle and enhances the system's flexibility across various payload configurations. Currently, MA61C-CubeSat is deployed for the SPiN-2 mission, scheduled for launch in Q4 2025, where it functions as a digital interface adapter and payload controller for a high-resolution camera system. The aim of the mission is two-fold: one is to showcase its abilities to send/receive the data to/from the payload and the platform, and the second is to reach TRL 9. The technical implementation detailed in this paper covers the design and development methodologies used to adapt the MA61C-CubeSat for the platform. It elaborates on the hardware assembly, interface protocol configuration, and iterative testing procedures that were undertaken to ensure compatibility and performance under various operational conditions. Detailed test results will be provided to highlight the system's stable data handling performance, timing synchronisation, and command execution. These results will confirm that the MA61C-CubeSat works well in a setup with multiple suppliers, proving its compatibility with modular satellite designs. By offering an adaptable configuration and quick integration of different subsystems, the MA61C-CubeSat provides a scalable and reliable solution for modern space missions.