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THE CUAVA-2 EARTH OBSERVATION SATELLITE: DESIGN AND LESSONS LEARNT FROM ITS PREDECESSOR CUAVA-1

Abstract

In this paper we report on lessons learnt from the in-orbit CUAVA-1 CubeSat and applied to a future CUAVA-2 CubeSat, both projects led by the ARC Training Centre for CubeSats, UAVs, and their Applications (CUAVA). CUAVA was established in December 2017 to train and create an Australian workforce in sustainable, advanced manufacturing, space and UAV industries of national importance. The Centre aims to fundamentally change the capabilities and applications of CubeSats, UAVs, and their instruments and to progress these devices to create a major commercial value with widespread applications. The 3U CUAVA-1 satellite was deployed into orbit from the International Space Station (ISS) on 6 October 2021. At the time of writing, the CUAVA team has not received any signals from CUAVA-1. CUAVA-2 is a 6U CubeSat intended for an early 2023 launch with two primary payloads: (1) a hyperspectral Imager designed by a space photonics group at the University of Sydney to provide a technology demonstration and data for applications across agriculture and forestry, coastal and marine environments, urban areas, water hazard and mineral exploration; and (2) a GPS reflectometry payload developed by the Australian Centre for Space Engineering Research (ACSER) at the University of New South Wales . The reflectometry payload will be measure GPS signals scattered off the sea in order to determine the sea state remotely. In this paper, we present and discuss the root cause fault analysis for the CUAVA-1 mission, identify the lessons learnt and the associated design inputs, and show how we leverage these lessons and inputs to design the next generation CUAVA-2 satellite.