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OIRTHIRSAT: A STUDENT NANOSATELLITE MISSION DEMONSTRATING IN-ORBIT PROCESSING FOR THE STUDY OF COASTAL DYNAMISM

Abstract

Coasts are highly dynamic environments and have been critical for the development of human infrastructure throughout history. The ongoing threat of climate change means that our coastlines are under threat and require accurate models to enable researchers to predict how ecosystems, habitats and man-made developments will be affected with rising sea levels. Current researchers utilise data from platforms including Sentinel and Landsat or from private constellations. Public-funded missions provide free access to data but there are sometimes significant delays from the moment of capture to when the data is available. Private solutions are more responsive, but come at a significant cost and are not affordable for researchers requiring large training datasets for AI algorithms. OirthirSAT, a student team from the University of Glasgow entered the Nanosat Design Competition run by LaunchUK, the United Kingdom's spaceflight programme, and won access to a £600,000 challenge fund to design a nanosatellite mission to generate responsive and targeted datasets on UK coastlines. The OirthirSAT platform will image UK coastlines using a multispectral imager before extracting coastline vectors using artificial neural networks in orbit. This novel approach will improve the responsiveness of generated data compared with traditional Sentinel and Landsat missions by minimising the data size and the time taken to downlink critical data. This paper details the design of the nanosatellite platform and wider systems to realise the OirthirSAT mission as part of the LaunchUK Nanosat Design Competition. A description of the programme structure and team organisation is provided to highlight the key academic and industry input that has helped to support the OirthirSAT team through the preliminary and detailed design phases.