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JAMSAIL: A CUBESAT DEMONSTRATION MISSION FOR GNSS INTERFERENCE MAPPING AND
A REFRACTIVE SOLAR SAIL

Abstract

The JamSail mission is an educational CubeSat aiming to design, develop, and demonstrate two new technologies on a small satellite, tentatively scheduled for launch in 2025. When launched, JamSail will demonstrate the functionality of two new payloads in low-Earth orbit. Firstly, a flexible, low-cost GNSS interference detection payload capable of characterising and geolocating sources of radio interference on the E1/L1 and E5a/L5 bands will be demonstrated on a global scale. The data produced by this payload can be used to target anti-interference actions in specific regions, and aid in the design of future GNSS receivers to better mitigate specific types of interference. If successful, the flexibility of the payload will allow it to be remotely reconfigured in orbit to investigate additional uses of the technology, including a potential demonstration of GNSS reflectometry aboard a CubeSat. Secondly, a compact refractive solar sail will be deployed capable of adjusting the orbit of JamSail over time, with no additional fuel requirements. This sail will be used to raise the semi-major axis of JamSail over the span of the mission. Additionally, using the sail as a novel method of attitude control will be demonstrated, utilising the adjustable refractive properties of the sail as a means of manoeuvring. Once the mission has concluded, the sail will facilitate rapid passive deorbit of the CubeSat. JamSail is currently in the testing phase, and the payloads will continue to be refined until the end of 2024. This paper discusses the key objectives of the JamSail mission, the design of the two payloads, expected outcomes of the mission, and future opportunities of the technologies as a whole.