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ITCAN: A 3U CUBESAT FOR REAL-TIME IN ORBIT FUNCTIONAL TESTS

**Abstract**

In recent years, the usage of small satellites and their constellations has increased dramatically for scientific measurements and technological missions. As these missions' objectives become more ambitious, the requirements of providing higher communication bandwidths/data-rates and higher navigational accuracy in severe environments become more critical. Due to the limited frequency spectrum, existing radio waveforms cannot fully address these challenges; therefore, new waveforms/ algorithms need to be developed. Furthermore, the new Global Navigation Satellite System (GNSS) applications in low Signal to Noise Ratio (SNR) and high dynamic environments also need new GNSS acquisition and tracking algorithms to be developed. While the development and functional testing of these algorithms can be done on the ground, the final testing and operational verification still require access to actual satellite signals in the real environment. To solve this problem, an innovative In-orbit Testbed for Communication and Navigation functions (ITCAN) is proposed in the form of a 3U CubeSat that employs a payload for communication, navigation and other functional applications. The arrangement of major subsystems of ITCAN CubeSat is designed so that the user can place any desired payloads.