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PRODUCING A 3U CUBESATS' ADCS SYSTEM COMMAND SCRIPT TO TRACK STARS IN OUTER SPACE

Abstract

Tracking a star in outer space can be very challenging, especially with a nano-satellite such as 3U Cube Sats due to its limited ADCS orientation capacity. However, being involved with a 3U Cube Sat Mission under the name SHARJAHSAT1 developing at my Space Center SAASST in Sharjah, we plan to be UAEs' first Hard X-RayCube Sat to be sent to space. This abstract describes my current task, at a Student Research Assistant position, which is to program Telemetry Commands to the ADCS system of SHARJAHSAT1 in form of a C+ script which I am creating from scratch, to track any star, for 10 minutes. Methodology is to combine the knowledge of Programming, Space System Engineering - mainly coordinate transformations from RPY to Equatorial or vice versa and ADCS component study. The task explores to receive the total orientation data of the ADCS at our Ground Station in real time and then re-orient the satellite in real time for exactly 10 minutes of its' Collimator facing towards the target star. As we know, the ADCS is made up of several sub-components categorized as sensors and actuators which have their own orientation coordinate system. Extracting the coordinate system of ADCS's Star Trackers and total ADCSs' orientation is used and then the programmed script orders the ADCS System to undergo coordinate transformations each second up till 10 minutes. This application of maneuvering the ADCS System for Tracking Stars is to be further applied to my undergraduate Senior Thesis which would be on developing simple a Detector System(Payload) with a Self-Orientation System of its own, to be sent to outer space as well, inspired from Voyager-1 Space Mission.