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DESIGN OF AN AUTOMATED SYSTEM AT THE GROUND SEGMENT FOR DATA ACQUISITION,
PROCESSING AND ARCHIVING FOR 'PRATHAM' IIT BOMBAY

Abstract

The 'Pratham' IIT Bombay student satellite project aims at quantifying the total electron count in the Earth's ionosphere using the method of Faraday rotation. Ground Segment can be considered as the most important part in establishing the communication link with the satellite for the data acquisition. This process needs to be accurate and optimized for the data to be useful to the scientific community. Automation of the Ground segment can help us achieve the required level of accuracy by reducing human error and other factors and further simplifying the process of communicating with the satellite. The paper highlights the importance of using off the shelf components while designing the automatic system for the Ground Station. This system consists of a set of antennae satisfying rigid condition which need to be oriented in a specific alignment with respect to the satellite for maximum signal reception. Maintaining the correct orientation is important as the concept of Faraday rotation needs the losses due to antennae pointing to be minimal for precise data reception. This is achieved by a control flow designed to regularly acquire updated orbit elements from the web and feed it to the hardware that further instructs the rotor to align the antennae accordingly. The signal received here is then sent in for demodulation followed by decryption to extract significant information out of it. Parallely the payload information travels through assorted set of instruments, logging the measured data and the calculated information in IONEX format. Apart from the technical front, the paper briefly describes the social missions of the project which aim at providing acquired knowledge to the society and supports the open source school of thought by providing all the calculations and simulations open for anyone to utilize.