SPACE SYSTEMS SYMPOSIUM (D1)
System Engineering Tools, Prcesses and Training (2) (6)

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SYSTEM ENGINEERING FOR SRMSAT

Abstract

SRMSAT is being designed and developed by the students and faculty of SRM University. One of our main objectives is to build SRMSAT as a Nanosatellite bus which can be used for future missions. The mission life of SRMSAT will be one year. Being a Nanosatellite the main constraints are mass and power. The SRMSAT has a mass of 11 Kg and average power generated is 14 watts. The power generation will be done by four solar panels mounted on four faces of the satellite. The SRMSAT has cubical shape with a dimension of 286mm x 286mm x 286mm. The SRMSAT comprises of eight different subsystems viz. PAYLOAD, STRUCTURES, POWER, TELEMETRY AND TELECOMMAND, ADCS, OBC, THERMAL and GROUND STATION. The objective of SRMSAT is to monitor the green house gases in near Infrared region (900nm to 1700nm). Since it is an atmospheric observation, a 10:30 AM Polar Sun Synchronous orbit with an altitude of 650 km and inclination of 98.10 has been selected. Three-axis stabilisation is being implemented in order to obtain desired pointing accuracy. Due to the power and mass constraints in house developed Magnetorquer coils are being used as actuators. The primary attitude sensor is a magnetometer along with GPS. Solar Panel Data Management (SPDM) has been selected as secondary attitude determination scheme. Special trade off has been done for the selection of Commercial Off the Shelf (COTS) components. The On Board Computer System has a star architecture wherein we have only one CPU which performs command and data handling. The satellite will be using the amateur band for communication at 437 MHz and 144 MHz The satellite will also contain an in house developed beacon for tracking. SRMSAT will be transmitting the payload data to the Ground Station at the rate of 9.6 Kbps for 9 minutes. At Ground Station for decoding and displaying of the payload data, a Graphical User Interface (GUI) based system has been designed by the Payload Subgroup.

Keywords: Nanosatellite Bus, Cubical, Three-axis stabilisation, Polar Sun Synchronous orbit, SPDM, Amateur Band, Beacon.