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NANO SATELLITE BASED ENVIRONMENTAL MONITORING

Abstract

A generic nano satellite called NIUSAT is under development at Noorul Islam Centre for Higher Education (NICHE) of Noorul Islam University (NIU). The NIUSAT is a three axis stabilized satellite of size 274x274x195 mm cuboid as the mainframe accommodating all the housekeeping sub systems like telemetry, tele-command, power, attitude and orbit central systems (AOCS) components, Ob-board computers etc. There are four deployable solar panels generate about 40Watts of power during sun-lit period. A 10Ah capacity Li-ion battery provide power during eclipse period. The AOCS comprises of sensor like sun-sensors, magnetometers, MEMS Gyroscopes and a star trackers for sensing the attitude of NIUSAT and actuators like Miniature Reaction Wheels and magnetic torquers to provide control torques for the satellite. UHF transmitters and VHF receivers provide for telemetry and tele-command operation. Separate UHF/S-band transmitter is provided for payload data transmission to ground at much higher data rate. The first mission of NIUSAT is planned with a course resolution multi-spectral camera providing about 32m resolution images for agricultural and disaster management support applications. The NIUSAT is also planned to accommodate a store and forward payload collect data from various gateway points across the country. In addition to the primary objective, the NIUSAT is proposed to be used as a data reception, storage and forward terminal to receive the environmental data collected by various wireless sensor network (WSN) nodes spread all over the country for the collection of environmental data like green house and other polluting gases and uplinked to NIUSAT through transmission gateways located at few places. It is proposed to collect the above environmental data on a day to day basis. The stored data is re-transmitted to the ground station periodically or wherever the nano satellite passes over the ground station.

This paper presents the concepts of environmental data collection using the WSN and the nano satellite. By implementing such a scheme the environmental monitoring can be achieved in a cost of effective way.