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Author: Prof.Dr. Shobha Rekh
Karunya University, India, shobhapaulson@karunya.edu

Mr. Marappa Krishnaswamy
Indian Space Research Organization (ISRO), India, kmswam@yahoo.com
Ms. Hepzibah Ernest
Karunya University, India, hepzibahernest@karunya.edu

DESIGN AND DEVELOPMENT OF A NANO SATELLITE FOR SHIP MONITORING

Abstract

A nano satellite is being designed and fabricated with various payload options like messaging payload, data collection payloads, voice audio broadcasting payloads and Automatic Identification System (AIS) payloads. The nano satellite will help in identifying the ships and aircrafts in distress in the mid sea / air. An Automatic Information System payload along with a medium resolution colour imaging camera would be integrated in the satellite. The Proposed nano satellite will be of size 275x275x195mm³, weigh about 15 kgs and can generate about 40 watts of power during sun lit period. A Li-ion battery will be available to provide power during the eclipse periods. The satellite will be three axis stabilized using sun sensors, magnetometers and gyroscopes as sensors and magnetic torquers as actuators. The communication system will comprise of VHF/UHF transceivers for transmitting the on board telemetry signals and handling the telecommand operations. There will be an On Board Computer to process the received AIS signals and store the data in its on board memory. The processed data would be transmitted to the ground station, merged with the data with the ground received data, and the ship position information and overlaid on the google map so that it could be used by the stakeholders. The medium resolution colour camera will also provide the real time image of the area of the monitoring region. The imagery data can also be used for monitoring the agricultural aspects of the region and also provide the date related to disasters like flood, land slide, etc., A dedicated ground station will be established at the Karunya University campus. The proposed ground station will comprise of UHF, VHF and S- Band antennae to receive the KAUSAT health status through the telemetry, to transmit the telecommands for various modes of operation and to receive the processed AIS and the imagery data through the S Band antenna. The antennae are mounted on a mast with two axes drive system to orient the antenna to the nano satellite when the satellite passes over the orbit. The ground station will also contain the mission control systems and the image and data processing systems to interface with the satellite and the users. It may be noted that large number of ships are moving around the Indian sub continent, and India being a major space faring nation, it is important that India should play a major role in this arena.