Paper ID: 39305
oral
student

EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

Author: Mr. EuGene Kim
The University of Sydney, Australia

Dr. Xiaofeng Wu
The University of Sydney, Australia
Mr. Warwick Holmes
Australia

PRELIMINARY SYSTEM DESIGN OF HISA – A HYPERSPECTRAL IMAGING SATELLITE FOR AUSTRALIA

Abstract

Hyperspectral imagery can be used to identify and classify different objects and materials from space by measuring the reflectance, emission and absorption of electromagnetic radiation in each pixel over a wide area in a very short amount of time. It is also cheaper to operate ($0.09USD/ha based on Hyperion data) compared to aerial hyperspectral imaging platforms. By integrating a hyperspectral imaging payload onto a smaller satellite, the time and cost of development is remarkably decreased whilst maintaining the same or higher reliability than that of traditional larger satellites. Advancements in technology have also made it possible for components to be easily accessible with fast turnover times.

The University of Sydney is proposing the design and development of a small satellite, HISA (Hyperspectral Imaging Satellite for Australia), with hyperspectral imaging and remote sensing capabilities to provide dedicated coverage of Australian land and agriculture. The satellite platform is to be built around the primary payload, a hyperspectral camera which is selected carefully to meet customer requirements and optimised to output the best spatial resolution whilst maintaining spectral density in each pixel of the image. The secondary payload is a high resolution optical camera for earth observation using different modes of capture – single point tracking and continuous multi target shooting to acquire information on areas of interest.

This research presents a preliminary system design of a satellite platform with hyperspectral and high resolution imaging capabilities for Australian land and agriculture. The design improves upon previous hyperspectral missions by optimising system variables for maximum data utility and throughput. The first half of the paper presents the mission requirements and customer demands while the latter half describes the payloads and various subsystems of HISA.