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Spaceborne Hyperspectra Imaging Development in Malaysia

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The remote sensing activities in Malaysia began in 1990s with concentration on the theoretical modeling of scatterers. Later on, Malaysia started the sensor development and measurement which included the development of anechoic chambers as well as ground based multifrequency and multiporalized scatterometer. In 2000s, the design and development of airborne remote sensing sensor such as synthetic aperture radar (SAR) and optical sensor was initial. Plan to developed own airborne SAR and multisepctra camera as well as collaboration with overseas research institute was took place. In year 2012, sensors on board UAV (both SAR and EO) have been successfully developed and tested, several high resolution images are obtained. In order to obtain larger coverage of the illumination footprint, the spaceborne remote sensing is necessary. A spaceborne Hyperspectra imaging sensor development project has been identified and initial by Centre of Remote Sensing and Surveillance Technologies, Multimedia University and Astronautic Technology (M) Sdn.Bhd. In this project, a small nano-class satellite with onboard Liquid Crystal Tunable Filter (LCTF) Hyperspectra Camera will be designed and constructed. LCTF hypersepectra camera will be designed to fit in the 10cm x 10 cm x 30cm nano-class satellite as well as confined to others electrical and mechanical constraint of spaceborne platform.The LCTF camera module consists of LCTF, Closed-circuit Television (CCTV) lens and Charge-couple device (CCD) board. LCTF sensor utilizes electronic controlled LCTF which allows rapid and vibrationless selection of wavelength from visible to IR range spectrum. The major advantages of this LCTF sensors are light weight (approximate 250g for sensor), larger number of band selection (about 600 bands) and lower cost compare to conventional multispectral camera. Therefore, it enables the usage of smaller space platform and further reduce the development cost and launching cost of satellite.Due to the large amount of data generated by the hyperspecta camera, it is necessary to reduce the size of the data so that the acquired data can be downloaded to the earth station during every satellite pass. An onboard FPGA-based multispectral image compression subsystem will be developed in this project to alleviate the memory and communication bottleneck of the small satellite.

Keywords: Hyperseptra Imaging, Spaceborne, LCTF