

Unmanned Aerial Vehicle (UAV) operated imaging system for forest and agriculture applications

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Innovative and compact system consisting of CIR (Color Infrared) and hyperspectral imagers integrated into a very light UAS (unmanned aerial system) with modern classification algorithms provides significantly improved ways for remote sensing for forest and agriculture applications. Tekes, the Finnish Funding Agency for Technology and Innovation, has granted a funding for this large cooperation research project of four research institutes and several companies. The project is coordinated by University of Jyväskylä. The objective of the project is to be able to evaluate forest and agriculture biomass changes and spatial variations. There are also application possibilities for the military and for all kinds of aerial environmental observation. The possibility to calculate digital elevation model and plant coverage models of the forest area and crop fields provides means to estimate the biomass. The full UAS CIR and hyperspectral imaging system is capable of recording 5..12 Mpixel CIR data and hyperspectral data up to 5 Mpixel spatial resolution in the wavelength range 500 – 900 nm at a resolution of 10...30 nm @ FWHM. The overlap between successive images is 60..80% which makes it possible to calculate the digital elevation model of the target area. The UAS system has been tried in summer 2011 in Southern Finland for the forest and agricultural areas. During the first test campaigns the CIR camera and hyperspectral imager were flown over the target areas at separate flights. The design and calibration of the hyperspectral imager will be shortly explained. The test flight campaigns and their preliminary results are also presented.



Flight Configuration of UASI FPI Based Hyperspectral Imager

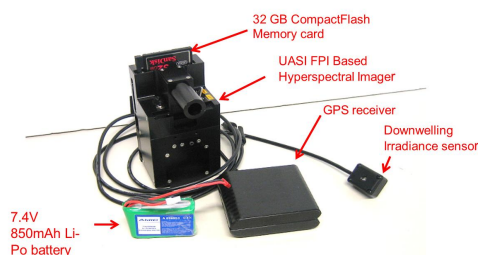


Figure 1. CIR camera imaging with Gatewing X100 UAV and flight configuration of Fabry-Perot Interferometer based hyperspectral Imager.

References

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