UAV operated Hyperspectral Imager for forest and agriculture applications

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VTT Technical Research Centre of Finland has developed a lightweight Fabry-Perot Interferometer (FPI) based hyperspectral imager weighting only 400 g which makes it compatible with various small UAV platforms. The concept of the hyperspectral imager is published in SPIE Proc. 7668 and 8186B. This UAV hyperspectral imager is capable of recording up to 5 Mpix multispectral data in the wavelength range of 500 – 900 nm at resolutions of 10-40 nm, Full Width Half Maximum (FWHM). One 32 Mbyte spectral data cube can be stored in 1.5 s into internal memory buffer. The user can configure the system to take either a spectral data cube containing three 5 Mpix images or up to 54 VGA resolution images. Each raw image contains data from one, two or three wavelength bands which can be separated during post processing. This allows a maximum of 9 spectral bands to be stored in high spatial resolution mode or up to 162 spectral bands in VGA-mode during each image burst. Image data is stored in a compact flash memory card which provides the mass storage for the imager. The field of view of the system is 26° x 36° and the ground pixel size at 150 m flying altitude is around 40 mm in high-resolution mode. The design, calibration and test flight results will be presented.

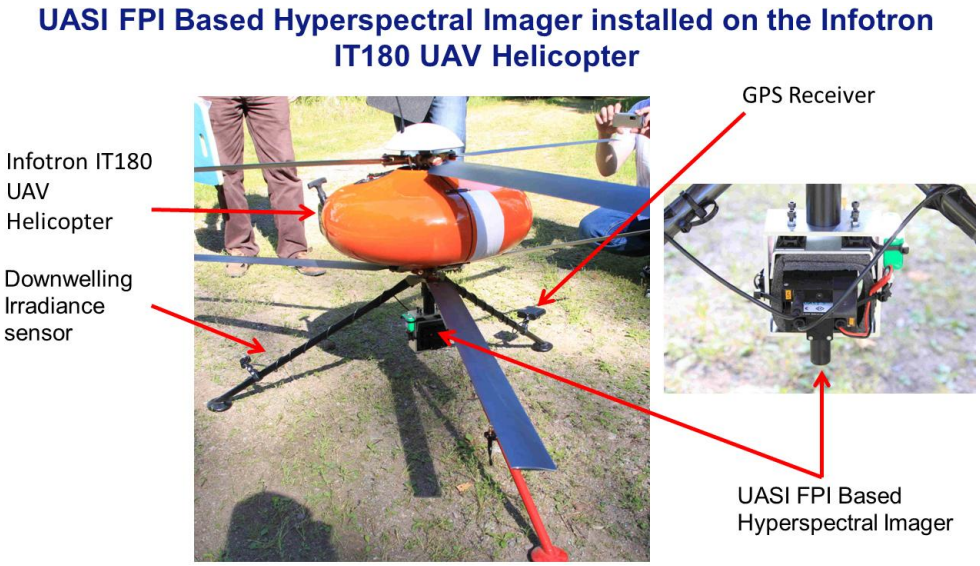

Figure 1. FPI based hyperspectral Imager integrated into Infotron IT180 UAV helicopter of the East Lapland Vocational College.

References

[1] Saari, H., Aallos, V., Holmlund, C., Mäkynen, J., Delauré, B., Nackaerts, K. and Michiels, B. “Novel Hyperspectral Imager for Lightweight UAVs”, Proc. SPIE vol. 7668 (2010)

[2] Mäkynen, J., Holmlund, C., Saari, H., Ojala, K., Antila, T., “Unmanned aerial vehicle (UAV) operated megapixel spectral camera”, Proc. SPIE 8186B (to be published, 2011).