Specolo: A Turnkey Flying Spectroradiometer System

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Abstract:

Aerial videography and still photography are the main applications of commercial grade unmanned aerial systems (UAS). Therefore integrated digital cameras are available out of the box for many UAS. These systems are usually sufficient for remote sensing applications relying on textural or geometric features.

However, remote sensing applications utilising radiometric or spectral features (e.g. estimating pigment concentrations in vegetation, assessing water quality) require calibrated sensors with well-defined radiometric and spectral characteristics, usually with larger dynamic ranges than those provided by digital cameras. While small, lightweight sensors with low power consumption have become available in recent years, their integration in UAS is done on a case by case basis requiring extensive engineering input, often leading to unsatisfactory results with respect to in-flight sensor control and requiring special expertise to operate.

Here we present a spectrometer module that is ready to be plugged into a commercially available UAS. Full in-flight control over the spectrometer is given via a laptop or tablet computer through the standard radio link. This plug-and-fly ability lets the user focus on the application without having to worry about engineering details. Its ease of use provides the potential for application by non-remote sensing and engineering experts like farmers, land managers, park rangers and environmental consultants.

We will explain and demonstrate the different components of the system, consisting of the spectrometer plug-and-fly module, in-flight control app and post-flight pre-processing software. We will show initial results from applications ranging from vegetation, bushfire, agriculture, fresh water to ocean colour.

*Figure **Error! No sequence specified.**. The Specolo module mounted together with a GoPro camera on a Solo UAV from 3D Robotics.*