



Construction of a small and lightweight hyperspectral imaging system

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The analysis of the reflected sunlight offers great opportunity to gain information about the environment, including vegetation and soil. In the case of plants the wavelength ratio of the reflected light usually undergoes a change if the state of growth or state of health changes. So the measurement of the reflected light allows drawing conclusions about the state of, amongst others, vegetation. Using a hyperspectral imaging system for data acquisition leads to a large dataset, which can be evaluated with respect to several different questions to obtain various information by one measurement.

Based on commercially available plain optical components we developed a small and lightweight hyperspectral imaging system within the INTERREG IV A-Project SMART INSPECTORS.

The project SMART INSPECTORS [Smart Aerial Test Rigs with Infrared Spectrometers and Radar] deals with the fusion of airborne visible and infrared imaging remote sensing instruments and wireless sensor networks for precision agriculture and environmental research. A high performance camera was required in terms of good signal, good wavelength resolution and good spatial resolution, while severe constraints of size, proportions and mass had to be met due to the intended use on small unmanned aerial vehicles. The detector was chosen to operate without additional cooling. The refractive and focusing optical components were identified by supporting works with an optical raytracing software and a self-developed program.

We present details of design and construction of our camera system, test results to confirm the optical simulation predictions as well as our first measurements.