UV-VIS-NIR Video Spectrometer and Miniaturization

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Hyperspectral cameras produce 3D data cubes composed of 2D spatial (x, y) and 1D (λ) spectral data and are typically characterized by the spectral range, the number of spectral channels and the spatial size of the entire image. Recently snapshot hyperspectral imaging has become an umbrella definition for all non-scanning imaging spectroscopy techniques, however, there are different technologies available on the market. Cubert´s development teams focused on two technologies.

-Prism-based Sensors: Using prism-based sensor technology, in 2012 Cubert constructed its first hyperspectral snapshot camera to offer a 50 x 50 pixel spatial resolution and 125 spectral channels between 450-950nm, under 500 g. The superior stability of the snapshot technology has made this model, the FireflEYE S185, the market leader in the hyperspectral UAV (Unmanned Aerial Vehicle) community since 2012.

-Light Field Technology: In 2020 Cubert has introduced a fundamentally new snapshot technology that enables extremely high spatial and spectral resolution. The new camera offers 410 x 410 pixel native image resolution resulting in an unparalleled 168,100 image spectra, each with 100 spectral bands covering 450-850 nm, taken in a few milliseconds, the camera´s weight is under 350 g. The ULTRIS 20 is the first hyperspectral camera based on 'light field technology', where both the intensity and direction of incident light rays are used to produce spectral images. Equipped with a 20-megapixel CMOS sensor, a continuously variable bandpass filter and a lenslet array, the camera is able to capture a full hyperspectral data cube in a single capture. This technology enables very high image speed and the production of hyperspectral videos. Industrial situations often compose of rapid changes such as rotations, movements or processes. ULTRIS20 can image those events with high spectral resolution in real-time. Machine vision and inspections are more easily and accurately applied to industrial processes using this camera. This is unique and a promising feature in spectral imaging.

Conventional spectral scanners and many snapshot cameras are limited in their ability to capture randomly changing processes, events or objects in time and space. A spectral video imager provides a superior approach. Cubert's video imaging technology combines high resolution and small size with high-speed spectral imaging. The high acquisition speed of our cameras, as well as data quality, form the basic requirements for true video spectroscopy. In fact, snapshots capture static moments, while real life situations often encompass an array of changes, such as motions, actions and processes. Cubert can detect those events with high spectral resolution in (almost) real-time. This ability to capture up to 10-20 complete hyperspectral data cubes per second enables the creation of hyperspectral videos, a novel feature that has lots of potential. Image based quality assessment or event mapping for moving objects would support higher accuracies i.a. in food industry or chemical imaging.