

When an image is analysed and its full spectrum is displayed, we call this a 'spectral image'. Using an 'Imaging Spectrometer', information can be extracted from such an image in a way not possible using purely visual colour perception. For example, a number of independent observers may judge that two documents or pictures, with entirely different spectral signatures, contain identical colours.

Spectral imaging has obvious benefits in sectors such as security, where forged documents can be read spectrally as well as checked visually. In addition, the concept can also provide benefits in medical diagnostics, process control and remote sensing - the spectral signature of vegetation and forest canopies can provide a good indication of their state of health; and the same is true for human tissue.

The design of an Imaging Spectrometer can be simplified by using a geometry that acquires a thin line from an image onto a 2D image detector, such as a low cost CMOS device, which can be found in many digital cameras. As the line from the image is arranged vertically, the Spectrometer will 'spread' the associated spectral information horizontally, so that the spectrum of each point in the line is recorded. A full 2D spectral image can then be built-up by sequentially measuring lines, rather like the way an image is built-up on a TV screen.

As part of our ongoing commitment in optics, our work has led us to develop a compact and highly efficient Fourier Transform Imaging Spectrometer based on the above principle, which uses simple optics and is centred on our patented monolithic, two component interferometer. Other applications are currently under investigation for which it is anticipated that the use of this device will enable measurements that are normally confined to the laboratory, to be performed routinely in natural environments. One thing is for sure – we will soon start to see the world around us in a completely different light.

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