Hyperspectral camera detects counterfeit medicine and traces of blood

December 18 2017

Specim Oy, a VTT spin-off, has developed the world's first mobile hyperspectral camera for the fast, high-level analysis of a range of samples. VTT Technical Research Centre of Finland contributed its own expertise to the development project, in the form of fast measurement data processing algorithms and methods. The extremely high-precision hyperspectral camera, which resembles a normal digicamera, recognises materials and their differences from an image and provides results immediately on-site. Such information can be used to detect plant diseases, skin diseases, counterfeit art, faults in food and medicines, or detecting and identifying traces of blood and other samples at crime scenes.

The hyperspectral camera measures the intensity of light in different wavelengths when reflecting off a surface. The measured spectrum reveals the chemical composition of a sample and is thereby a 'fingerprint' of a subject's material. In practice, a spectral image can be used to identify the substances and materials in a sample by comparing the spectrum measured with known spectra in a library.

"A high-precision hyperspectral camera can see visible and near infrared wavelengths of 400-1,000 nanometers, whereas the human eye can only see visible wavelengths of 400-700 nanometers. In addition to detecting a wider spectrum, the camera is far superior to the human eye in terms of its wavelength resolution," says Senior Scientist Pasi Hyttinen from VTT.

Sample recognition is considerably faster and easier with a lightweight, compact and easy-to-use device than with similar, larger devices. Measurements and results are produced immediately, on-site, without complex mathematical or signal processing skills, whereas the traditional approach involves packing the sample and sending it to a laboratory, from which the result will come in a few days at the earliest.

"A truly portable hyperspectral camera enables measurements previously done in a laboratory to be performed in the field, at sites where imaging was not previously possible. For users, this will markedly accelerate decision-making and reduce costs," says Harri Salo, Program Manager at Specim.

For example, the age of a blood sample can be calculated. This enables the timing of a set of events, which is critical in a criminal investigation. Blood changes chemically as it ages, which can be seen directly in its spectrum.

"It is easy to develop new detection applications for the camera with its application development environment. These applications can be loaded directly into the hyperspectral camera and thus its measurement and analysis can be modified. In addition to research, the new product therefore offers a platform for measurement solutions serving a range of industrial sectors such as food and health, forensic investigation, security, recycling, art or agriculture," says Esko Herrala, Sales Manager at Specim.

Provided by VTT Technical Research Centre of Finland