BlackFusion: HAIP Solutions simplifies RGB and SWIR sensor fusion for industrial sorting and inspection

In industrial sorting and inspection, understanding what a material is made of can be just as important as knowing what it looks like. While RGB cameras capture colour, shape and surface characteristics, SWIR hyperspectral imaging provides additional spectral information for material identification or chemical analysis. Combining these complementary data sources creates new possibilities, but requires precise calibration and synchronisation between the sensors.

With BlackFusion, HAIP Solutions provides a dedicated software solution that connects its BlackIndustry RGB camera with the BlackIndustry SWIR 1.7 series. The software handles digital sensor alignment and synchronised data acquisition, allowing visual and hyperspectral information to be captured and evaluated within a coordinated workflow.

Precise sensor alignment through digital mapping

As RGB and SWIR cameras differ in sensor technology, spatial resolution and positioning, their data must be aligned to establish a reliable correspondence between measurements. BlackFusion addresses this through digital mapping, allowing both cameras to be calibrated to a shared scan line.

A guided calibration process supports the adjustment of camera positions and the correction of rotational offsets. Once configured, BlackFusion provides live access to both data streams, including a combined RGB and SWIR waterfall view. This enables users to monitor the acquisition and directly compare corresponding visual and spectral information.

By managing these processes within a dedicated software environment, BlackFusion reduces the effort involved in setting up and operating a combined imaging system.

Integration into industrial inspection and sorting workflows

The combination of RGB and SWIR imaging is particularly relevant for applications where sorting or inspection decisions depend on several material characteristics. In recycling, for example, visible information about colour, shape and object position can complement spectral data used for material differentiation. Similarly, food inspection processes can benefit from evaluating surface characteristics alongside composition-related spectral information.

BlackFusion also provides optional live HSV colour classification and preprocessing functions. For integration into existing machine vision systems, command-line interfaces and dedicated C++ and Python live capture clients are available, allowing developers to incorporate the synchronised data streams into application-specific processing workflows.

The software complements HAIP Solutions' BlackStudio, which provides tools for hyperspectral analysis, visualisation and classifier development. Together, both solutions support the workflow from sensor calibration and data acquisition to material analysis and classification.

BlackFusion is available free of charge and is continuously being developed to support the integration of RGB and hyperspectral imaging in industrial environments.

More information here: https://www.haip-solutions.com/hyperspectral-cameras/blackfusion/

About HAIP Solutions GmbH

HAIP Solutions GmbH, based in Hannover, Germany, develops integrated hyperspectral imaging solutions for industrial and research applications. The company’s portfolio includes hyperspectral cameras covering VNIR to SWIR ranges, application-specific illumination systems and software for data acquisition and classification. HAIP focuses on delivering reliable, application-ready systems that simplify the use of hyperspectral technology in real-world environments.