ITRES Applications

Airborne Hyperspectral Mapping

Landmine & Target Detection

Seeing Through the Trickery

Plastics Probability Map Generated From SASI (SWIR) Imagery
Courtesy ITRES & DRDC Suffield

Surface-Laid Landmine & Target Detection

Custom Physics-Based Pattern & Spectral Classification Algorithms

Real-Time Mine Detection & Processing System

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ITRES Applications

Airborne Hyperspectral Mapping

Detecting Acrylics/Nylon
Using SWIR

Detecting Human Skin
Using SWIR

Threshold Analysis for Certain
Hard Plastics Using SWIR

Landmine Detection Research Leads to Development of SASI & Real-Time System

Over 18 years of landmine detection collaboration with the Threat Detection Group of Defence R&D Canada (DRDC) has led to significant hyperspectral imaging developments at ITRES. The latest of these include the development of the hyperspectral SASI (Shortwave Airborne Spectrographic Imager), and a real-time processing and analysis system. The SASI is a calibrated 100 channel imager sensitive to spectral wavelengths between 950 and 2450 nm. Using a HgCdTe array extends this sensor's spectral coverage past 1700 nm (the typical spectral cut-off of InGaAs arrays). This part of the SWIR spectrum brings additional discrimination power for identifying surfaces in urban environments.

The development of a real-time mine detection system using VNIR wavelengths measured by the CASI (Compact Airborne Spectrographic Imager) was followed by successful proof-of-concept tests conducted in 2000. A commercial offshoot of this work saw the 2005 release of the **Real-Time Processing System** (RTPS).

Target Detection Capability Demonstrated Using the SASI

The images seen at left were part of a successful investigation into the use of SWIR wavelengths to quickly identify such disparate materials as acrylics, nylon, plastics, paints, and human skin. To this end, two persons were imaged alongside an assemblage of landmines, surrogates, and unexploded ordnance (seen along the right side of the images). Some items of note:

- Both persons are wearing clothing featuring varying acrylic and nylon materials. In the SWIR wavelengths displayed in the top image, the higher the concentrations of these materials, the brighter the surfaces appear. Also note the mines along the right side of the image;

- The middle image shows enhanced spectral reflectivity for human skin (bright in the imagery). Note how the reflectivities are equal between the two persons, even though their skin pigmentations differ visually;

- Both are wearing plastic-lensed glasses; note how in the bottom image the lenses worn by the person on the left are identified, while those of the person on the right are not (both are indistinguishable to the naked eye.

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