Hyperspectral Imaging System

- **Lightweight, portable, low power consumption**
- **Wide field of view, high throughput, and sensitivity**
- **Interchangeable optics**
- **Optimized data acquisition**
- **Automated real time processing and data compression**
- **Intelligent feature recognition and spectral identification**

Applications:

- **Industrial process control**
- **Damage assessment (natural disaster, fire, etc.)**
- **Agricultural crop assessment**
- **Air pollution monitoring**
- **Ocean and land environmental assessment**
- **Natural resource monitoring and management (fish, forests, etc.)**

The Sensor:

The system is a hyperspectral imaging system for the VISual Near IR (VIS/NIR) spectral range that utilizes patented spectral technology to acquire, process and exploit hyperspectral data in real time.

General Description

An End-to-End Hyperspectral Imaging (HSI) system with real-time anomaly detection and identification. The system has three major components, the spectrograph and front optics, the CCD camera, and the data acquisition and processing unit.

The sensor component is capable of wide field-of-view coverage, high throughput and sensitivity with interchangeable optics for selectable IFOV from any pre-selected geometry. The data acquisition component is optimized for continuous operation and it is integrated to the Adaptive Spectral Processing and Identification System (ASPIS™). ASPIS™ is an automated real-time processing system with data compression for unsupervised spectral demixing and identification. The imaging system is a compact lightweight sensor with low power consumption.

Component Description

- **The Front Optics**

The front optics of the sensor includes an interchangeable lens (C-mount or Nikon fixed length or zoom lenses) for flexible field of view with high throughput, high sensitivity and large flat field (> 12 x 12 mm, f# 2).

- **The Spectrograph**

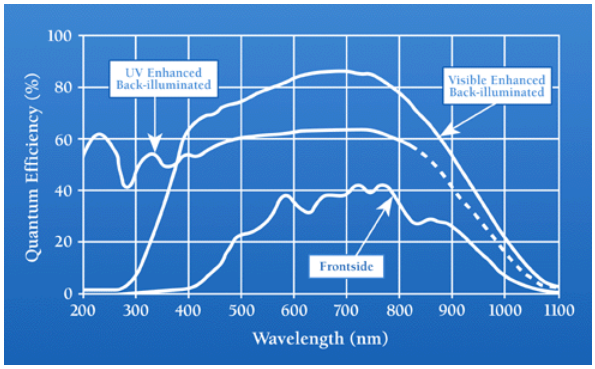
The spectrograph uses a convex holographic grating with less than 0.2 pixel smile and keystoning and less than 15 µm blur circles. The wavelength range covers a selectable band of 640 nm in the 300-1050 nm range with a holographic grating spectrograph. A maximum of 512 spectral bands with 1.15 nm resolution (12 µm slit) are possible with Signal-to-Noise ratio > 150:1 from 400-900 nm at 5% reflectance. The spatial resolution and swath of the sensor is determined by the front optics, with up to 60 degrees wide field of view coverage.

- **The CCD Camera**

The camera has a thermo-electrically cooled, back-thinned, back illuminated CCD and 0.3-1.0 µm response with 12 x 12 µm pixel size. The low noise (<50e^- at 8 Mpix/sec readout), high dynamic range (14 bits/pixel) sensor has a high frame rate (90 fps max at 32 spectral bands) and 1024x2048 pixel split frame transfer rate with quad A/D readout (9 - 40 Mpix/sec). The camera is capable of on and off-chip binning for adjustable bandwidth, band selection and wide range of illumination coverage without saturation (5% - 95% ground reflectance).

- **The Processing Component**

The processing component of the system is hosted on a Windows NT workstation, with 128 Mb RAM, a high resolution flat panel LCD monitor and a disk array (> 36Mb). The computer system includes the data acquisition system and the hyperspectral data compression and processing system, which is based on the Adaptive Spectral Processing and Identification System (ASPIS™).



Sensor Efficiency Response

Advanced Power Technologies, Inc.:

Advanced Power Technologies, Inc. is a highly innovative R&D and product company founded in 1986. Staffed with a worldclass multidisciplinary team of engineers and scientists, APTI is a well respected provider of technical solutions for both commercial and government customers.

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