



**SURFACE OPTICS
CORPORATION**

SOC-700 Visible Spectral Imaging System

The SOC-700 Hyperspectral Imaging (HS) System is the affordable solution to your off-the-shelf real-time HS processing needs. Out of the box, the SOC-700 can be used in demanding analysis, quality control and detection work either locally or over a network. The imager, processor and analysis software are integrated in a well-calibrated, high-quality package that is both portable and easy to set up and use.

'Real-Time' HS Imaging

'Real-time' applications such as machine vision, biological screening, color quality assessment, and target detection require immediate feedback. HS imaging systems have shown promise in their ability to see slight variations in the spectral content of objects and have been used to discriminate between objects based upon their spectral signatures, but until the SOC-700, have been of little use where immediate feedback is required. This was primarily due to the high data volumes produced and the long data processing times, typical on the order of days if not weeks to arrive at an answer. The SOC-700 removes the processing bottleneck through an integrated system with on-board processing that can meet the demands of real-time applications.

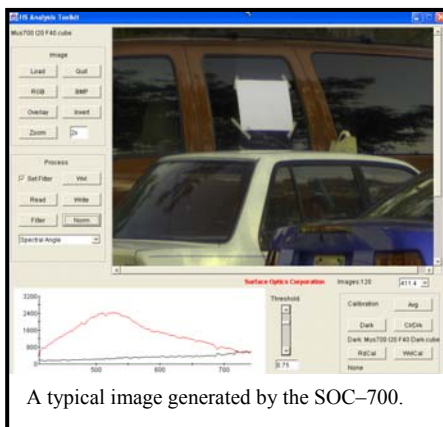
vector processor and software, the SOC-700 can record and process HS imagery at a rate of 64,000 120-band elements per second at 12-bit resolution. The system's spectral response covers the visible and NIR spectral range from 0.43 – 0.9 microns and can be used in normal to low lighting conditions with variable exposure times. The system can be configured to operate either as an imager or line scanner.

With six programmable correlation channels, three integration channels, on-the-fly dark frame subtraction and calibration, the system can be configured to display color, panchromatic, simulated sensor and detect or reject with a high degree of confidence up to 6 spectrally identified elements.

Whatever your needs, visual examination for quality control, screening, quality assessment, identification or research, the SOC-700 is an affordable and practical means of exploring and utilizing the spectral content in nature.

The SOC-700 System

Comprised of a high-speed, low-noise visible camera, high quality visible spectrometer, integrated scanning system,



A typical image generated by the SOC-700.

SOC-700 Visible Spectral Imaging System



SPECIFICATIONS

SOC-700 Hyperspectral Imager

Comprised of a high-speed, low-noise visible camera, high quality visible spectrometer and integrated scanning system and software, the SOC-700 can obtain and record up to 64,000 120-band elements per second.

Highlights:

Spectral Band: 0.43 – 0.9 microns

Number of Bands: 120, 240 or 480
(configurable)

Dynamic Range: 12-bit

Line Rate: Up to 100 lines/second (120 bands)

Pixels per line: 640

Exposure Time: 10 -> 10⁷ microsecond

The camera system comes equipped with software for correlation, dark-frame subtraction and analysis. Six different software correlation algorithms are available and additional algorithms can be added through the convenient SDK. Of course, the system can also be linked to the MP-1 Midis Processing card to perform image processing in real-time.

MP-1 Midis Processor

The heart of the SOC-700 Hyperspectral Image Processing System is the MP-1 Midis Processor which can perform on-the-fly hyperspectral processing at super computer speeds. Capable of processing 128,000 128-band vectors per second, the MP-1 can match the processing requirements of any currently available hyperspectral imaging system and can be easily configured to work with any system.

With six correlator channels exercising SOC's differential area or Zero-Mean differential area algorithms, you can be guaranteed of finding matches within a scene as it is acquired. With three integrator channels you can simulate true color or the output of any visible sensor. The integrators are fully programmable by the user to simulate any sensor response function or any integration at all.

Features:

Processing Rate: 7 msec per 128-band pixel, includes:

- Six spectral correlations
- Correlation Algorithms Available:
 - Differential Area (DA)
 - Zero-Mean DA
- Three Integrations
- Dark frame subtraction
- Calibration
 - o Spectral smile
 - o Radiometric
 - o Spectral

Highlights:

With on-the-fly processing there is:

- No longer a need to archive large data volumes, the answer comes in real-time as the data is acquired
- No longer a need to wait days or even weeks for your answer
- The ability to monitor processes and respond immediately

DATA

The SOC-700 provides the following output dataset to the user:

- raw data cubes
- calibrated data cubes
- correlation cubes
- RGB or sensor simulated cubes

OPERATION

The SOC-700 can be operated on a local machine or remotely over a local area network. Communication between the GUI and the system are accomplished through sockets and multiple cameras can be controlled from the same machine.

Initialization and use is simple. A single serial and single parallel data line are connected between the server PC and the camera. Turn on the computer, turn on the camera and bring up the Easy HP software. You are ready to acquire and analyze hyperspectral images.

SOFTWARE

Easy-HP instrument control software gets you up and running immediately. Start taking hyperspectral cubes in minutes through the user-friendly interface and on-line documentation. Program the processor board to find what you are looking for and generate precise, calibrated color imagery in an instant. Within minutes you will have hyperspectral data you can work with.

HS-Analysis software. Included with the SOC-700 package. Use HS Anal to explore cubes produced with the SOC-700 imager. Set correlation filter threshold interactively, view the data spectrally, experiment with the different correlation algorithms found on the MP-1 processor to find what works best for your situation.

Other Image Analysis Software: The SOC-700 produces open format binary data which can be read into any number of Image Analysis packages. There is no need to reformat, the data is Band Interleaved by Line (BIL) with a fixed length header.

APPLICATIONS

Machine Vision

- color sorting for automotive, electronics and plastics
- web and surface inspection
- identification and sorting of agricultural products
- color measurement
- chemical analysis

Agricultural

- Precision Farming
- Classification
- Water Stress
- Crop health

Scientific

- Microscopy
- Biological analysis

Military

- Target Discrimination
- Identify Friend or Foe

Remote Sensing

- Ground truth
- Material Mapping

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