middleton SPECTRAL VISION

Reveal Scan[™] Hyperspectral Imaging System for Art, Cultural Heritage and Art Restoration

Middleton Spectral Vision is pleased to introduce Reveal Scan[™] — a hyperspectral imaging system for Art and Cultural Heritage. Designed for art restoration and science departments. Reveal Scan[™] combines high-performance hyperspectral imaging cameras with a large media motorized X-Y positioning stage. The software-controlled stage allows quick and easy set up for large or small paintings. Once the painting dimensions are entered, the software calculates how many images will be required to capture the entire painting. Enter the painting name, then select scan. The system automatically acquires each image.

Hyperspectral Imaging a proven technique for the analysis of fine art and cultural heritage

Hyperspectral Imaging is a powerful imaging technique that combines 2D imaging with spectroscopy, an exploratory tool to investigate how electromagnetic radiation interacts with matter. From the conservator point of view, this could be measurements of pigments, chemical composition, exposing the under-drawings of paintings and monitoring the condition of works of art over time. Capturing a hyperspectral image is different than standard RGB photography. Hyperspectral imaging is a scanning technique. The camera moves via a motorized slide across the scene to render an image. It's similar to a piece of paper being placed on the glass of a copier/scanner. Once the scan button is pressed, a white illuminated line moves across the paper. When it is finished, the scanned document is displayed. A pushbroom hyperspectral camera works in a very similar fashion to create an image.



Reveal Scan[™] Hyperspectral Imaging System from Middleton Spectral Vision

Spectral Cameras Optimized for Different Wavelength Regions

Valuable wavelength information for art is contained in the 400–2500 nm wavelength range. Multiple sensors are required to cover this range. This can include the VNIR 400–1000 nm, the NIR 900–1700 nm or the SWIR region 1000–2500 nm. Middleton Spectral Vision offers spectral camera options for each of these wavelength regions.



VNIR spectral camera (top) SWIR spectral camera (bottom)

Powerful Software Tools for Image Analysis

Middletion Spectral Vision has developed KemoQuant[™], a powerful, but easy-to-use software package. Hyperspectral images are much larger files than RGB images. Proper software is needed to pre-process the raw image for analysis.

The hyperspectral image contains a full wavelength spectrum for each pixel in the image. Users can

select individual or groups of pixels to observe the spectrum. Multiple spectra can be overlaid in a normalized scale to look for differences in spectral features from anywhere in the image.

KemoQuant[™] also features advanced algorithms for identification of pure components, or to create prediction models for future analysis. Images or spectra can be easily saved to standard file formats such as TIF, PNG, or JPG.



Chemical changing analysis performed using KemoQuant[™] Software from Middleton Spectral Vision

Specifications

Spectral Cameras

VNIR spectral camera Spectral range: 400–1000nm Digitization modes: 12 bit, 16 bit Spatial pixels: up to 2000 Spectral bands: up to 600 Binning: 2x, 4x, 8x

SWIR Spectral camera Spectral range: 1000–2500nm Digitization modes: 16 bit Spatial pixels: 384 Spectral bands: 288 Binning: 2x, 4x, 8x

Illumination System

Type: Dual line light Number bulbs per line: 8 Wattage per bulb: 20W Type: Quartz Halogen Brightness control: Yes

X-Y Scanning and Positioning System

Scanning are 60" in the scanning (horizontal) direction, 55" in the positioning (vertical)

Motorization

Precision lead screw powered by servo motors

Software

Reveal Scan™ Multi camera acquisition control software

KemoQuant[™] Analysis Software

Power Requirements

120v AC



Reveal Scan[™] hyperspectral imaging system diagram