

The Spectral Imaging Systems Laboratory (SISL) is located on the second floor of the Materials Science and Electrical Engineering Building. It has been developed for precision color measurement and the collection of multidimensional data sets. The principal sensors include two high spatial resolution digital still cameras, a conventional spectroradiometer, and a novel multispectral scanning system that yields several hundred bands of spectral data at each pixel in the image.

The digital still cameras are a Photometrics Model CH250 with a thermoelectrically cooled 1 Mpixel Kodak CCD array with 12 bits of gray scale on output, and a 6 Mpixel Kodak DCS 460c color digital camera built on a Nikon N90 body. The conventional spectroradiometer is a Gretag SPM-50 which provides its own illumination for measuring the reflectance of flat surfaces. The instrument provides a variety of spectral and colorimetric measurements.

The multispectral scanning system consists of 4 major components. The first is an EG&G Model 2020-31B High Efficiency telescope with a field of view selectable at 6 arcmin, 20 arcmin, 1°, and 3°, and an auxiliary close-up lens. The second is an Acton Research Corporation Model SpectraPro-150 spectrograph with a wavelength range of 0-1400 nm, a slit width adjustable from 10-3,000 μm , yielding a resolution of 0.4 nm or better and wavelength accuracy of 0.25 nm. The third component is an EG&G Model 1520A thermoelectrically cooled 256x1024 pixel CCD detector with sensitivity from 400-1100 nm and 18 bit dynamic range. Finally, the entire instrument is mounted on a computer-controlled Parker-Daedel azimuth-elevation positioning system with 0.2 arcmin repeatability and 5 arcmin accuracy.

Both the Photometrics camera and all parts of the multispectral scanning system are interfaced to a Compaq PC.

The laboratory includes two special sources of illumination. The first is a Macbeth Spectralight II-65B Viewing Booth for critical color matching and visual color evaluation. The viewing booth allows selection of five different illuminants: Daylight 6500K, Daylight 2300K, Illuminant A, Cool White Fluorescent, and Ultraviolet. The second is a monochromator based on a second Acton Research Corporation Model SpectraPro-150 spectrograph with a TS-428 tungsten-halogen light source. The mono-chromator provides a tunable source of very narrow-band illumination that can be precisely delivered where needed via an optical fiber. The entire unit can be controlled by a serial interface to a PC or via a handheld HP 48G calculator.

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