

AFRL

THE AIR FORCE RESEARCH LABORATORY



Air Force Research Laboratory Space Vehicles Directorate Imaging Sensor Characterization Laboratory

Description of Technology:

The characterization of electro-optical and infrared imaging sensors in a controlled environment prior to and during operational use on airborne and space platforms is required for full exploitation of the sensor's capabilities. Rather than being a one-time event, calibration on some regular interval is vital for understanding and correcting changes in sensor performance. The Imaging Sensor Characterization Laboratory specializes in highly accurate radiometric, spectral, and spatial characterization of imaging sensors as well as spectral scattering measurements and compensation for systems that employ gratings.

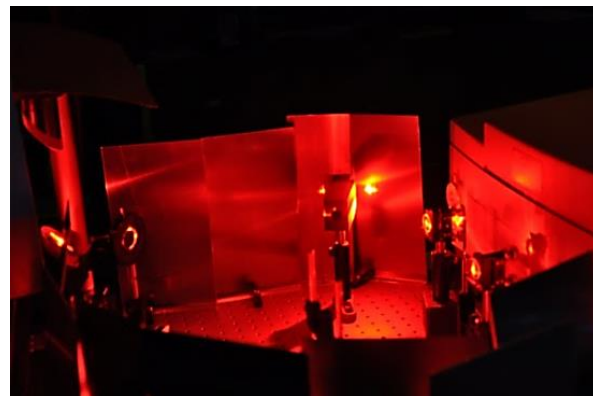
Unique to the laboratory is the ability to accomplish **Radiometric characterization** at a user or integration site in just a few days for apertures that are satellite-sized. Highly accurate calibration coefficients, a non-uniformity correction bad pixel map, and linearity information are the most common data products from a radiometric characterization. **Spectral characterization** provides system-level spectral response functions across the visible, near infrared, and short-wave infrared wavelengths. The AFRL Imaging Sensor Characterization Lab uses a supercontinuum laser coupled to a monochromator to generate a highly accurate spectral source with a high number of photons. This allows simultaneous

measurement of a sensor's spatial pixels at each given wavelength.

Spatial response functions can be generated for apertures less than a few centimeters.



Imaging Sensor Characterization Laboratory



Optical parametric oscillator tuned to red

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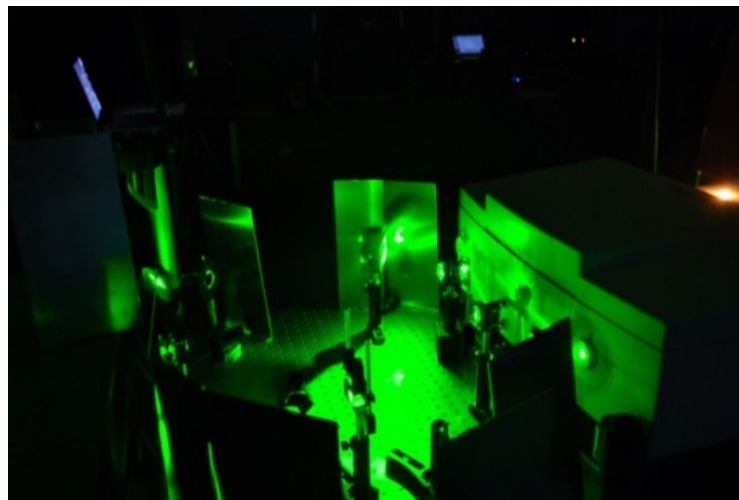
Spectral scattering describes the statistical variation in the diffraction of a photon with a specific wavelength off of a grating system. Spectral scattering in hyperspectral imaging sensors degrades signal-to-noise ratio and affects the depth of absorption lines in hyperspectral data, thereby negatively affecting the ability to compare signatures between sensors and standards. The Imaging Sensor Characterization Laboratory has a unique capability to measure scattering effects and generate a correction algorithm allowing the sensor data to be fully exploited.

Need for Technology:

Highly accurate characterization of a sensor is necessary to fully exploit sensor data and is particularly important when looking for dim or hard-to-find signals. The AFRL Imaging Sensor Characterization Laboratory works closely with the analysts using the data in order to innovate new characterization techniques that address emerging needs.

Collaboration:

The AFRL Imaging Sensor Characterization Laboratory teams with industry, Department of Defense and other government laboratories, and operational system program offices.



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