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**CornellEngineering**  
Civil and Environmental Engineering



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# REMOTE SENSING

Master of Science/  
Doctor of Philosophy

# REMOTE CONCENTRATION

Instruction and research opportunities are provided in remote sensing, digital image processing, and geographic information systems. Emphasis is in the field of optical remote sensing, both passive and active, and digital image processing, particularly as it applies to spectral image data. The scope of research activities encompasses methods for collecting, analyzing and interpreting remotely sensed data, and applications in engineering, agriculture, oceanography, geology, and planning in major geographic regions of the world.

The major research goal is to understand the physical interaction of electromagnetic radiation with the earth's atmosphere and surface. Modeling these processes leads to Optimal and innovative use of data collected from satellite and aircraft. Current research involves atmospheric correction of spectral image data (particularly over water) and the spectral and directional characterization of reflectance from natural surfaces. On the purely physical side, the primary work is in radiative transfer modeling of the scattering and absorption processes that give rise to the observed reflectance. The goal is to design models that, upon inversion, will yield physical properties of the observed surface (e.g., soil moisture and density, chlorophyll concentration, and water depth).



## REMOTE SENSING

### FACULTY RESEARCH

Graduate students collaborate with Remote Sensing faculty on research that pushes the boundaries of our knowledge. Our faculty has always represented the best the field has to offer—engineers and scholars of the highest caliber.

#### WILLIAM D. PHILPOT



**Research Interests:** My primary contributions have been in the analysis of spectral reflectance. This encompasses topics ranging from geometric and radiometric correction to spatial and spectral pattern recognition. The consistent thread running through my research is an interest in the way that light interacts with the earth's atmosphere and surface and how that affects the way the earth and water are seen from satellite and aircraft. That is, rather than being primarily concerned with the cultural or geographic patterns displayed in an image, my focus has been on what the spectral and spatial patterns at the pixel level imply about the earth's surface and the intervening atmosphere. Current research involves modeling reflectance from soil with the intent of characterizing the physical properties of the soil, e.g., material, size distribution, water content and density.

### STUDENT RESEARCH

#### JIA TIAN



"My research is focused on the remote sensing of soil properties – especially soil moisture - using directional spectral reflectance. Wet soil is not merely darker than dry soil; the spectral character of the reflectance changes in ways that appear to relate to the amount of water and how the water is interacting with the soil. Furthermore, directional observations are sensitive to the surface soil structure. The combination should relate to the soil type, surface soil moisture and surface soil structure. The goal is to develop a model that will relate the soil spectral-directional reflectance to soil properties. I particularly enjoy the interdisciplinary nature of the research and the insight that it provides into fundamental soil properties."