



Assistant professor Clint Slatton wins Nation's highest award for young researchers

Dr. Clint Slatton, an assistant professor with a joint appointment in the Electrical & Computer Engineering (ECE) Department and the Civil & Coastal Engineering (CCE) Department at the University of Florida, was named a 2006 winner of the Presidential Early Career Award for Scientists and Engineers (PECASE).

The PECASE program recognizes outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership at the frontiers of knowledge. This Presidential award is the highest honor bestowed by the United States Government on scientists and engineers beginning their independent careers.

The award ceremony took place on Nov 1st, 2007 in Washington DC. Clint was presented the award by Dr. John Marburger, Director of the Office of Science and Technology Policy and Dr. William Rees, Deputy Under Secretary of Defense. He, along with the other awardees, then met with President Bush for a group photograph on the North steps of the White House.

Clint was 1 of only 58 awardees covering a broad spectrum of physical and social sciences, and was the first awardee from the University of Florida in seven years. This single-investigator award includes a \$1,000,000 research grant administered over a five-year period. Clint's PECASE was awarded by the Department of Defense. The nomination originated in the Environmental Sciences Division of the US Army Research Office (ARO).

A fundamental problem that arises over and over in many indirect sensing applications, including medical imaging and remote sensing

of the Earth, is that the parameters of greatest interest often cannot be measured at all or at the required resolution to explicitly reveal a system's behavior. As a result, scientists and engineers must rely heavily on mathematical models that attempt to describe the physical dynamics of complex systems. However, such physical models often lead to ill-posed inverse problems because numerous variables describing the system must be estimated from a small set of observation parameters. Clint's work will address this issue. The title of his proposal was "*Prediction of Diffractive and Non-Diffractive Propagation in Forested Terrain by Combining Probabilistic and Physical Modeling*".

Clint says that, "This work will focus on combining simplified physics-based models of signal propagation that exhibit different diffraction characteristics (e.g. geometric optics, microwave scattering, etc.) with modern pattern-recognition methods and high-resolution 3D geometry obtained from airborne laser ranging (lidar). It will allow one to predict signaling performance and to formulate and solve well-posed inverse problems for a large range of signal types that are used for sensing and communications in complex environments, such as forested terrain. The key departure from previous works is an integrated approach in which the physical models are parameterized such that the inputs are completely specified by the *available* remote sensing data, while also learning from the lidar data the structure of locally correlated regions over which the simplified physical models can be applied with sufficient accuracy."

In related work, Clint is a co-Investigator on a National Science Foundation (NSF) Center in the CCE Department, the National Center for Airborne Laser Mapping (NCALM). This NSF Center was established to produce state-of-the-art airborne lidar (laser detection and ranging) measurements of the Earth's surface and land cover for NSF researchers and to develop new capabilities for remote sensing of the Earth using airborne lidar. He also collaborates with several faculty in ECE.

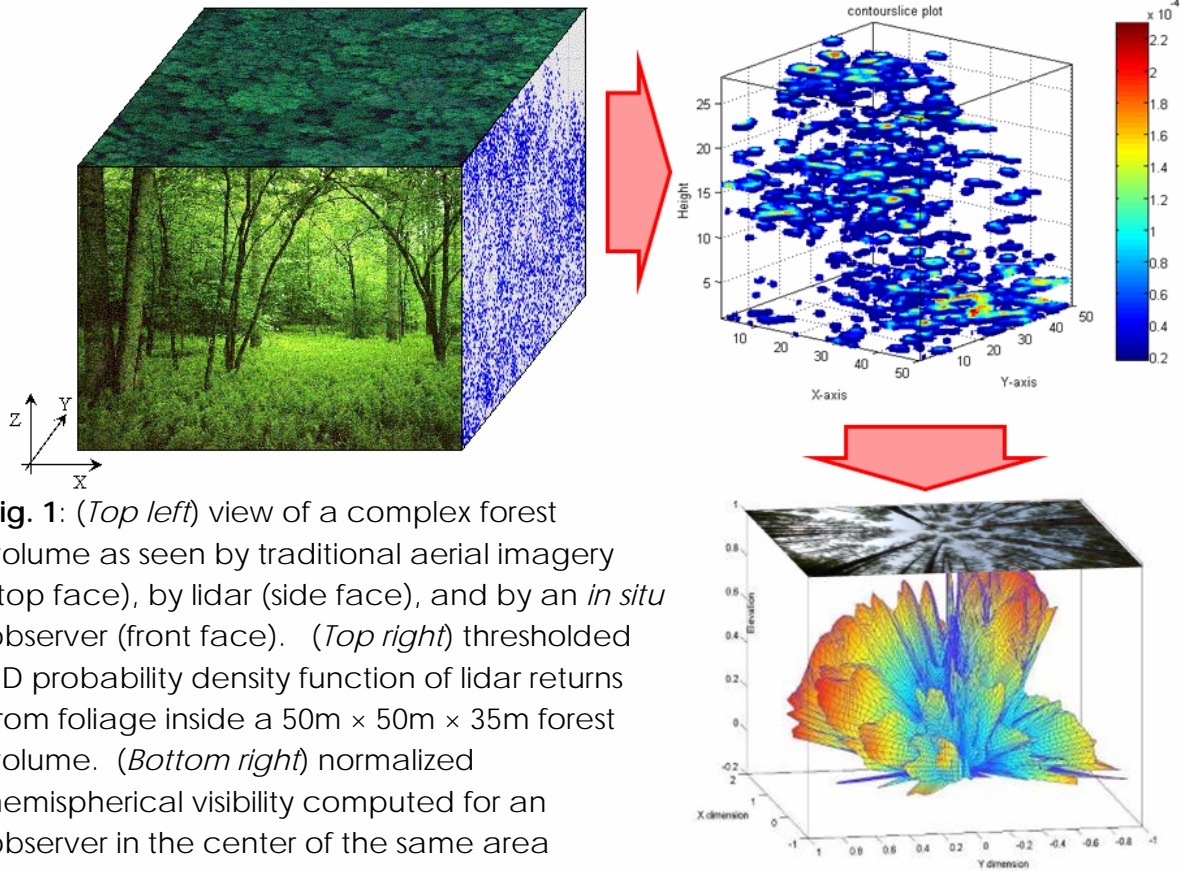


Fig. 1: (*Top left*) view of a complex forest volume as seen by traditional aerial imagery (top face), by lidar (side face), and by an *in situ* observer (front face). (*Top right*) thresholded 3D probability density function of lidar returns from foliage inside a $50\text{m} \times 50\text{m} \times 35\text{m}$ forest volume. (*Bottom right*) normalized hemispherical visibility computed for an observer in the center of the same area standing on the ground. A skyward fisheye lens photograph of a forest canopy appears on the