

## **High Resolution, Slant Angle Scene Generation and Validation of Concealed Targets in DIRSIG**

### **ABSTRACT:**

Traditionally, synthetic imagery has been constructed to simulate images captured with low resolution, nadir-viewing sensors. Advances in sensor design have driven a need to simulate scenes not only at higher resolutions but also from oblique view angles. The three primary efforts of this research will be presented: real image capture, scene construction and modeling, and verification and validation of the synthetic imagery. High resolution imagery was collected of an area named Microscene at the Rochester Institute of Technology using the Chester F. Carlson Center for Imaging Science's MISI and WASP sensors using an oblique view angle. Three Humvees, the primary targets, were placed in the scene under three different levels of concealment. Following the collection, a synthetic replica of the scene was constructed and then rendered with the Digital Imaging and Remote Sensing Image Generation (DIRSIG) model configured to recreate the scene both spatially and spectrally based on actual sensor characteristics. Finally, a verification and validation of the synthetic imagery against the real images of Microscene was accomplished using a combination of rank order correlation, the RX algorithm, and texture metrics derived from gray level co-occurrence matrices. The model was updated following each validation using a cyclical development approach. The purpose of this research is to provide a level of confidence in the synthetic imagery produced in DIRSIG so that it can be used to train and develop algorithms for real world concealed target detection.

### **PRINCIPLE AUTHOR'S BIOGRAPHY:**

Captain Kris E. Barcomb is a United States Air Force officer. He has a Bachelors degree in Computer Engineering from Clarkson University and an MBA with a concentration in Information Technology from the University of La Verne. In his Air Force career, Captain Barcomb has worked as a Launch Controller, Deputy Director and instructor for the Atlas IIAS, Titan II, and Titan IV launch systems at Vandenberg AFB. He is currently finishing his Masters degree in Imaging Science at the Rochester Institute of Technology.