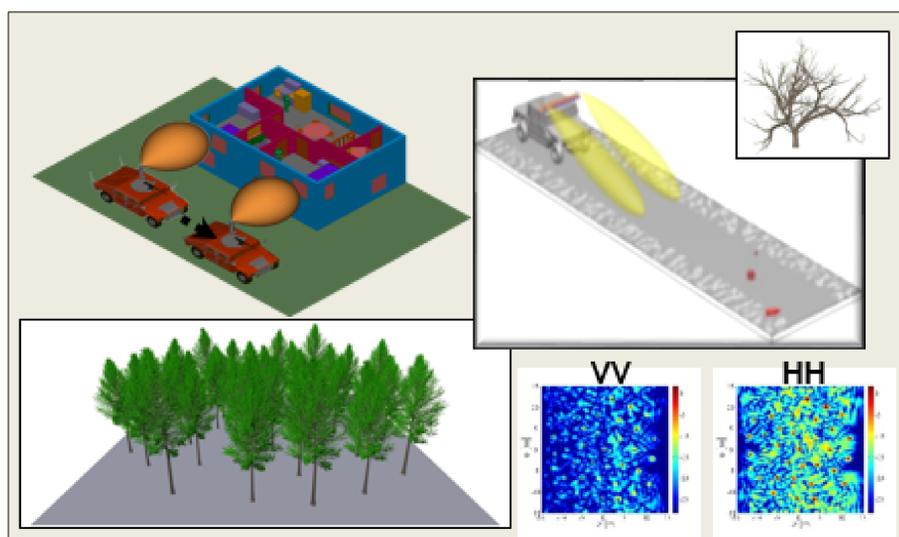


## S&T Campaign: Information Sciences Sensing and Effecting

Dr. Anders Sullivan, (301) 394-0838  
anders.j.sullivan.civ@mail.mil

### Research Objective

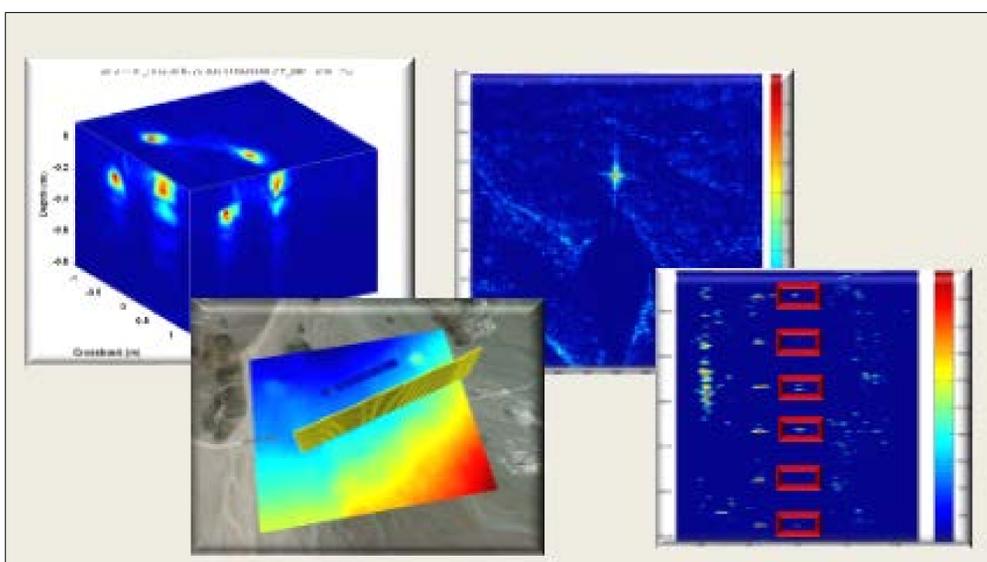
- Conduct research and development of all aspects of radar technology for detecting concealed and low signature radar targets of interest
- Applications include ground penetrating radar (GPR) for landmine and IED detection, ultra-wideband radar (UWB), sense-through-the-wall (STTW) radar, and foliage penetrating (FOPEN) radar



Target and Clutter Models for STTW, FOPEN and GPR Applications

### Challenges

- Developing high-fidelity radar signature modeling of targets embedded in realistic clutter backgrounds
- Developing advanced signal processing algorithms for synthetic aperture radar (SAR)
- Development of RF interference (RFI) mitigation techniques and strategies
- Development of cognitive radar techniques and approaches for the congested RF environment



3D Radar Imaging, SAR Processing and Target Detection

### ARL Facilities and Capabilities Available to Support Collaborative Research

- High performance computing (HPC) center
- Radar laboratory with network analyzers, scopes, signal generators, etc.
- Vehicle mounted ultra-wideband (UWB) radar testbed
- Indoor airborne SAR emulation facility (Rail-SAR)
- A. F. Martone, K.A. Gallagher, K.D. Sherbondy, et al., "Adaptable Bandwidth for Harmonic Step-Frequency Radar," International Journal of Antennas and Propagation, vol. 2015, Article ID 808093
- T. Bufler, R. Narayanan, and T. Dogaru, "Radar signatures of furniture elements," IEEE Transactions on Aerospace and Electronic Systems, vol. 51, pp. 521-535, Jan. 2015
- Ode Ojowu, Luzhou Xu, Jian Li, John Anderson, Lam Nguyen, Petre Stoica, "High-Resolution Imaging for Impulse-Based Forward-Looking Ground Penetrating Radar," International Journal of Remote Sensing Applications, 2015, 5(0), 11-24
- Lam H. Nguyen, Trac Tran, "Estimation and Extraction of Radio-Frequency Interference from Ultra-Wideband Radar Signals," IEEE IGARSS, July 2015
- Kenneth Ranney, Brian Phelan, Getachew Kirose, Kelly Sherbondy, Traian Dogaru, R. Narayanan, "Recent experiments using the ARL Rail-SAR," Proc. SPIE. 9461, Radar Sensor Technology XIX; and Active and Passive Signatures VI, 94610L. (May 21, 2015)
- Brian R. Phelan; Marc A. Ressler; Kenneth I. Ranney; Gregory D. Smith; Getachew A. Kirose; Kelly D. Sherbondy; Ram M. Narayanan, "Performance analysis of spectrally versatile forward-looking ground-penetrating radar for detection of concealed targets," Proc. SPIE. 9461, Radar Sensor Technology XIX; and Active and Passive Signatures VI, 94610J. (May 21, 2015)

### Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Collaborations sought in the following areas: advanced electromagnetic modeling, waveform design, RFI mitigation, all aspects of cognitive radar (hardware and software), advanced processing to enable real time signal processing, advanced radar architectures and design for highly sensitive low noise transceivers, UWB antenna concepts, radar concepts for UAV platforms