

# NASA SBIR/STTR Technologies

## S1.02-9012 - Scalable Architectures for Distributed Beam-Forming Synthetic Aperture Radar (DBSAR)



PI: Arvind Bhat

Intelligent Automation, Inc. - Rockville, MD

### Identification and Significance of Innovation

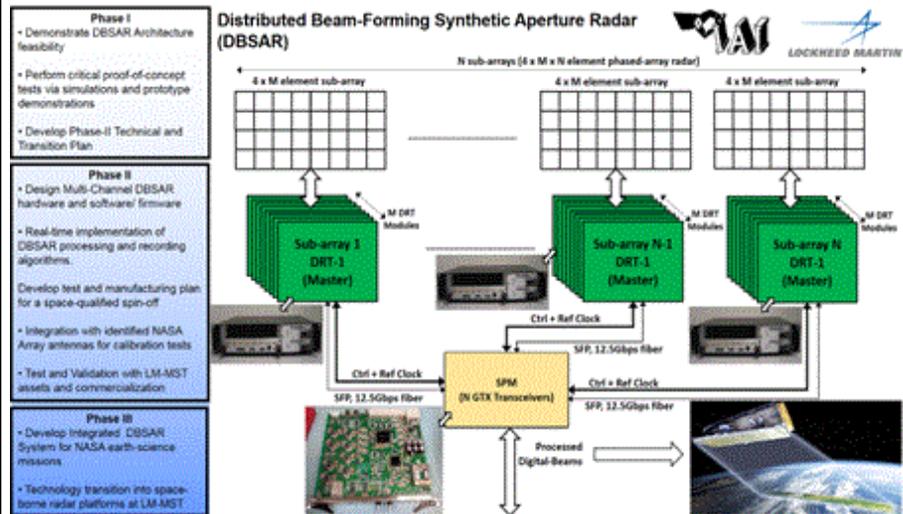
Conventional SAR operates in the Stripmap mode. Wide unambiguous swath coverage and high azimuth resolution pose contradictory requirements on the design of SAR systems. A promising technique to overcome this limitation is Digital Beam-Forming (DBF) on receive where the receiving antenna is split into multiple sub-apertures. This provides the capability of forming multiple beams via post-processing. DBF techniques applied to SAR systems can increase receiving antenna gain without a reduction of the imaged area and suppress interference signals. A highly capable DBSAR instrument design would consist of wideband Transmitter-Receiver Module (TRM), precise multi-channel timing and synchronization and reconfigurable processing engine that can host the SAR processing, calibration and control routines. IAI's proposed approach is modular, scalable and meets the NASA goals of developing an innovative analog/digital hardware design for the implementation of distributed DBSAR architectures

Estimated TRL at beginning and end of contract: ( Begin: 3 End: 5 )

### Technical Objectives and Work Plan

The overall Phase II objective will be to design the complete DBSAR system consisting of DRT modules, the DBSAR software/firmware and leveraging the IAI RFNest™ blocks for the SPM demonstration.. This system will be tested initially at NASA GSFC facilities. The Phase II will conclude with distributed phased-array synchronization tests at LM-MST facilities. The specific objectives are:

- Objective 1- DBSAR System Design
- Objective 2- Develop DBSAR software/firmware
- Objective 3- DBSAR Hardware-Software Validation
- Objective 4- Distributed, synchronized, phased-array Demonstration



### NASA Applications

NASA and other Government applications include:  
Wideband, Reconfigurable Radar systems for manned/ un-manned aircrafts  
Digital Receivers and Exciters (DREX)  
Radar Target Generators to validate radar systems before deployment  
Planetary and Earth subsurface sensing and imaging  
Foliage Penetration (FOPEN) SAR.  
Through Wall Radar

### Non-NASA Applications

Non-NASA commercial applications include:  
Real-time digital processors.  
Multi-node Network emulators  
High bandwidth arbitrary waveform generator and data recorder  
Ground Penetration Radar (GPR).

### Firm Contacts

Mark James  
Intelligent Automation, Inc.  
15400 Calhoun Drive, Suite 190  
Rockville, MD, 20855-2814  
PHONE: (301) 294-5221  
FAX: (301) 294-5201

NON-PROPRIETARY DATA