

NASA SBIR/STTR Technologies

S20.01-9356 - Low-Frequency, All Digital Radar (ADR) for Biomass and Ice-sheet Investigations



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Identification and Significance of Innovation

Low-Frequency, All Digital Radar (ADR) can be a key component for NASA Phased-array and tomographic Radar systems spanning multiple earth-science measurement objectives. One of the key attractions of ADR is hardware re-use for different scenarios. Intelligent Automation Inc. proposes the design of an ADR system to meet the technology requirements listed in this solicitation. State-of-the-art technologies in the design of data conversion devices like Analog-to-Digital Converters (ADC), Digital-to-Analog Converters (DAC), Direct Digital Synthesizers (DDS) and reconfigurable logic devices like Field Programmable Gate Arrays (FPGA) MMIC make it possible to realize the concept of ADR with low SWaP and low-cost goals. The ADR will build upon IAI's Software Defined Radio/ Radar (SDR) design expertise. Our proposed approach is modular, scalable and meets the NASA goals of multi-channel, coherent altimeters along the cross track to obtain high resolution in the cross track direction.

Estimated TRL at beginning and end of contract: (Begin: 3 End: 6)

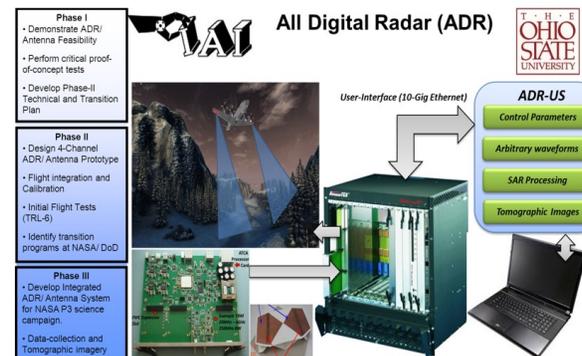
Technical Objectives and Work Plan

The Phase-I technical objectives are:

- Objective 1: Prove the feasibility of ADR design for NASA Science Applications
- Objective 2: Demonstrate a path to flight integration and subsequent tomography
- Objective 3: Develop transition plan for Phase-II ADR design, Flight integration and commercialization

The Work-Plan is summarized as:

- Kickoff meeting and requirement analysis
- ADR design documents generates (requirement, hardware, software, antenna, integration)
- Antenna paper-design and EM simulations
- Limited ADR Prototype tests on existing IAI platforms
- Generate Commercialization and Transition plan



NASA Applications

- Miniaturized, reconfigurable radar systems for UAVs
- Digital Receivers and Exciter (DREX)
- Radar Target Generators.
- Tomographic Radar for Biomass and Ice-sheet imaging.
- Algorithm development platform for existing NASA radar platforms (GISMO, EcoSAR, DBSAR, HIWRAP, URAD) or communications systems.

Non-NASA Applications

- Real-time digital processors
- Network emulators
- Arbitrary waveform synthesizers.
- Reconfigurable Radar and Communications prototyping.

Firm Contacts

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NON-PROPRIETARY DATA