

Topic: N181-006

Intelligent Automation, Inc.

S-Band Transmit/Receive Module for Airborne Navy Radars

Intelligent Automation, Inc. (IAI) develops cutting-edge technology and solutions for future battlefields by leveraging its uniquely multi-disciplinary collaborative environment and substantial IP portfolio; we excel at transitioning concepts into viable capabilities. Currently, IAI is developing an S-band Transmit/Receive (T/R) module with sufficient power density to make an airborne 360-degree Electronically-Scanned Array (ESA) viable as a functional surveillance asset. Our Multi-Spectral Phased Array Radar (MSPAR) is a complete RF-to bits solution that is modular, scalable and integrates the complete waveform and analog front-end solution into a smaller form factor allowing one building block to cover all radar and Identification Friend or Foe (IFF) functions. We hope to continue our radar modernization discussions with prime contractors and other OEM's on how MSPAR can revolutionize Communication Navigation Surveillance/Air Traffic Control capabilities.

Technology Category Alignment:

Command, Control, Communications, Computers, & Intelligence (C4I)

Electronic Warfare (EW)

Advanced Electronics

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SYSCOM: NAVAIR

Contract: N68335-19-C-0428

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0428

Department of the Navy SBIR/STTR Transition Program

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NAVAIR

Topic # N181-006
Miniature S-band T/R module for Phased Array Radar (MSPAR)
Intelligent Automation, Inc.

WHO

SYSCOM: NAVAIR
Sponsoring Program: PEO(T)
Transition Target: PEO(T)
TPOC:
(301)247-8566
Other transition opportunities:
Other radar or communication applications

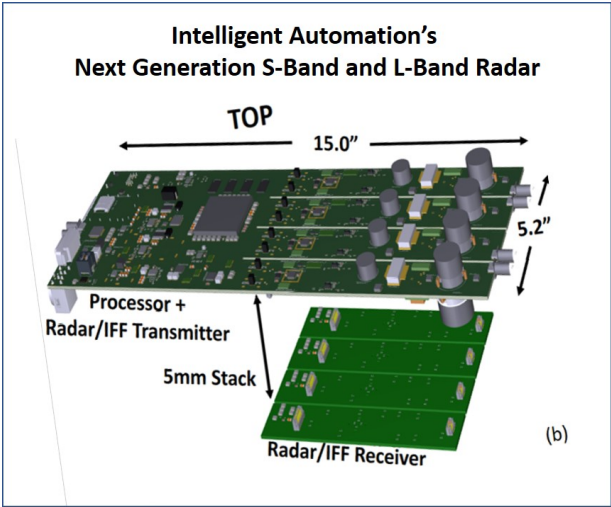


Photo courtesy of Intelligent Automation, Inc.

Notes:
MSPAR = Miniature S-band Transmit/Receive Phased Array Radar

WHAT

Operational Need and Improvement: The Navy is investigating an S-band transmit/receive (T/R) module with sufficient power density to make an airborne 360-degree electronically-scanned array (ESA) viable as a functional surveillance asset. The current state of the art T/R modules lack sufficient power density to obtain the desired Equivalent Isotropically Radiated Power (EIRP).

Novel ways are sought in order to increase power density to a usable level.

Specifications Required: Control SWaP-C!

Size: Target volume of the S-band module is 8.0 cubic inches.
Weight: The target weight of each module is < 8oz.
DC Power: Aircraft typically operate on 28 VDC and 115 volt 3 phase 400 HZ AC power
RF Power: High Peak Power, > 10% duty cycle.
Cost: Production needs to minimize element costs

Other considerations include: best possible efficiency, S-band frequency (3.3GHz nominal center frequency), Target 3dB Bandwidth: Greater than 15%, Receiver input center frequency: 3.3GHz, Receiver analog bandwidth: 700MHz

Technology Developed: Intelligent Automation, Inc. (IAI) is developing Transmitter/Receiver prototypes to demonstrate massive phased-array operation for airborne radar. IAI develops cutting-edge technology and solutions for future battlefields. MSPAR would provide significant improvement (RF and size) that would lead to increased surveillance performance in littoral and overland detection missions and Theater Air Missile Defense (TAMD) capabilities, with the added potential of upgrading legacy-radar programs.

Warfighter Value: It improves the state-of-the-art substantially: high power density to achieve desired EIRP Improvement (10 dB anticipated) and enabler for a 360 Degree electronically scanned array (ESA) surveillance asset covering both the S-band Radar and L-band Identification Friend-or-Foe (IFF) functions in one building block.

WHEN

Contract Number: N68335-19-C-0428

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design and fabricate MSPAR SEM prototypes to perform 2D sub-array testing.	Low	Completed prototypes	TRL 4	August 2020
Completed prototypes	Low	Completed firmware	TRL 5	November 2020
Comprehensive laboratory testing (IAI facilities) of Radar and IFF modes.	Low	Completed an passed tests	TRL 5	March 2021
Radar/ IFF testing at NAVAIR facilities with a prototype array antenna setup.	Med	Completed and passed tests	TRL 6	July 2021

HOW

Projected Business Model:
IAI is able to ramp up to low rate production within 3 months and then larger volumes within 6 months. IAI is also prepared to work with prime partners to enhance existing programs or to undertake new projects that will take advantage of the size and performance enhancements derived from this innovation.

Company Objectives:
Identify phased-array radars along with combat system stakeholders who wish to improve Transmit/Receive capabilities and to identify opportunities for additional MSPAR evaluation and integration with combat system components.

Potential Commercial Applications:
The U.S. domestic Radio Frequency (RF) semiconductor market supplies commercial as well as military entities and advances in semiconductor and Radio Frequency Integrated Circuit (RFIC) technology, though first implemented in military systems eventually transitioned to commercial product lines. Examples being Global Positioning System use and the evolution of the Internet and cellular phones.

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