Colorado Engineering Inc.

Advanced Direct Digital Exciter for Radar (ADDER)
The Advanced Direct Digital Exciter for Radar (ADDER) is a key component of a technology refresh for the SPS-49 system. It provides improved system performance and extends the service life of the system. The application for this product spans ship-based radar systems from UHF to Ku-band. Sustained competitive advantage is provided as this system offers significant performance improvement while lowering sustainment costs. The modular nature of the product offers opportunities to upgrade and refresh aging radar systems across the fleet at a reduced cost since they can leverage this technology. Previous successful development of similar boards used by the larger DREX+ system mitigates risk. The ultimate goal is to transition this technology into radar system upgrades across the DoD.

Technology Category Alignment:
RF Components for sensing, transmission and communication
Survivability
Radio Frequency (RF) (non-EW)

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SYSCOM: NAVSEA
Contract: N68335-19-C-0160

Room: FST at NAVSEA HQ
Signal Processing in identical form factors which are stackable in three dimensions. Defined solution applicable for Analog that provides a hardware and software-defined radio capabilities, enabled through the 3DR board family. CEI's digital exciter will eliminate the legacy analog approach, which has become difficult and costly to maintain ($10k/system/year with 45 A(V)/Vs in service). This design will reduce TOC and improve performance, while reducing parts count, noise, and instability. (Note: Cost savings figure provided by US DoN, NSWC - Crane)

Technology Developed: Digital to Analog Conversion module based on former SBIT, RARE, which has since been commercialized and adopted for multiple programs of record. RARE has since received the marketing name of 3DR, which is also known as 3D-RARE. This product family is referred to as "3D" because of its unique architecture enabling its scalability in three dimensions, which allows for a simple 6.25”x6.25” card to interconnect with very fast communication in six directions (2 in X, 2 in Y, and 2 in Z) simultaneously, rather than the older method of technology which enabled boards to interconnect through only one single point on a backplane.

Warfighter Value: The compact design reduces the footprint below deck, which results in size and weight savings. The modular form factor reduces costs related to sustainment and upgrade. The high density design improves cost-per-Watt performance. The increased digital signal processing offers a smaller size to boost computational capabilities.

Projected Business Model: SBIR Phase II awards funding the technology: Topic N151-057 (Receiver) PoP ending 3/16/2020; Topic N171-051 (Exciter) PoP ending 1/1/2020 (two Option years pending for 2020 and 2021). A PEO IWS RIF (contract N00024-18-C-4009) is funding the integration of the Receiver and Exciter into a product referred to as the Digital Receiver/Exciter Plus (DREX+) - the "Plus" includes digital waveform generation and digital signal processing. This RIF extends through June 2020. CEI is in the midst of designing, integrating, and testing the individual subsystems which will serve as a complete replacement for the SPS-49.

Company Objectives: The primary objective of Colorado Engineering, Inc. (CEI) is to become the primary solution provider for the NAVSEA Prime Contractor who will integrate the technical refresh on various classes of surface ships. CEI’s secondary objective is to become recognized as a leader in modular, low-cost, high-performance radar and computing solutions for sea, air, land, and space platforms.

Potential Commercial Applications: The SPS-49 is the primary end application for Topic N171-051. The modular architecture of the DREX+ will have applications across a large segment of surface ships' radar systems. The RIF funding by the Office of the Secretary of Defense was provided to ensure that the DREX+ will reach the necessary maturity level to serve as the foundation for radar system technical refreshes across all service branches.

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