Topic: N152-081

JEM Engineering

Synthesis and Realization of Broadband Magnetic Flux Channel Antennas

JEM's innovative frequency-independent Magnetic Flux Channel (MFC) antenna exploits efficient broadband coupling to the bound charge inherent in all magneto-dielectric materials. This enables efficient transmission and reception of RF communication signals in conformal installation environments that severely degrade the performance of conventional antennas using just electric charge control. Successful demonstrations of hardware in SBIR N112-113 laid the groundwork for our conformal frequency-independent designs, such as Archimedean and logarithmic spirals, in SBIR N152-081. Beneficiaries of this technology are networks or swarms of small, self-organizing UAVs to achieve specific intelligence, surveillance, reconnaissance or communications mission objectives. JEM Engineering, a woman-owned Maryland small business specializing in communication antenna research, design, manufacture and test, seeks teaming arrangements with government organizations and primes to validate system capabilities and incorporate the technology.

Technology Category Alignment:

None
None
None

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SYSCOM: NAVAIR
Contract: N68335-17-C-0316

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0316

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2018-736

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JEM Engineering LLC

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-234 (Next Generation Jammer)

Transition Target: PMA-263 (Small Tactical Unmanned Aircraft Systems) Micro-Unmanned Aerial Vehicle (UAV)/Unmanned Aircraft System (UAS)

TPOC:
(301)342-8672

Other transition opportunities: Networked swarms of micro-UAVs to conduct Communications Intelligence (COMINT), Electronic Intelligence (ELINT), & Signals Intelligence (SIGINT) missions

WHAT

Operational Need and Improvement: Micro-UAS platforms can be cost-effectively augmented/upgraded to support SIGINT & COMINT missions

Specifications Required: Size: Compatible with micro-UAS structure
Weight: < .25 LB
Frequencies: 0.2 to 6 GHz

Technology Developed: JEM has developed and patented a new type of antenna called a magnetic flux channel (MFC). The MFC is not affected by conducting platform structure like conventional antennas, which exhibit impedance mismatch, pattern coverage "suck outs" and decreased gain over large bandwidths.

Warfighter Value: A single warfighter can deploy a micro-UAS MFC sensor in a backpack and obtain a complete view of threat radio frequency (RF) emitters and communications in minutes.

WHEN

Contract Number: N68335-17-C-0316 **Ending on:** July 5, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demo MFC Loop on commercial UAV	Low	Simple Line of Sight (LOS) radio (one way) link closure	5	September 2018
Integrate MFC loop with UAV structure	Med	MUOS radio link closure	6	October 2018
Demo Line of Sight Communication (LOSCOM)/Satellite Communication (SATCOM) link closure	Med	portable 117G radio comm link	7	April 2019
Demo SIGINT capability	High	Detect and locate signal of interest	7	June 2019

HOW

Projected Business Model: JEM will work with host micro-UAV vehicle manufacturers to integrate JEM's MFC antenna technology. This may take the form of a license or JEM may participate in a portion of the UAS vehicle manufacture.

Company Objectives: JEM is renowned in the military and commercial communications industry for its unique antenna systems. We participate in all phases of the system's antenna component including design, fabrication, test and production. We seek teaming arrangements with government organizations and primes to validate system capabilities, incorporate the JEM's MFC antenna technology and to become the vendor of choice for conformal, frequency-independent Broad Band Magnetic Flux Channel (MFC) antennas to support line-of-sight and satellite communications applications.

Potential Commercial Applications: The unique ability of JEM's MFC antenna to be unaffected by close UAS platform materials allows us to achieve superior RF performance in a wide variety of host platforms

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