T5.05-2038 - Solar Sail Integrated Antenna Technology

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SBIR·STTR America's Seed Fund™ POWERED BY NASA

NON-PROPRIETARY DATA

IDENTIFICATION AND SIGNIFICANCE OF INNOVATION

Radio system technologies support a plethora of NASA space missions, among which communication and navigation technologies are extremely beneficial and critical to future missions; particularly, for enabling command, control, and data exfiltration on unmanned missions using efficient (high impact versus cost) small satellites. Low-cost, high gain, light-weight, and conformal active PAAs on flexible substrates are of particular interest in NASA's space communication networks. For example, these PAAs are readily integrated with solar sails, which are becoming a common viable propulsion solution for small space craft mission; where, the sails act as a compact deployable and multi-purpose footprint. In this use case, the arbitrary directionality of electronically steerable solutions is a must in order to allow independent control relative to sail orientation, which is situationally predicated.

TECHNICAL OBJECTIVES AND PROPOSED DELIVERABLES

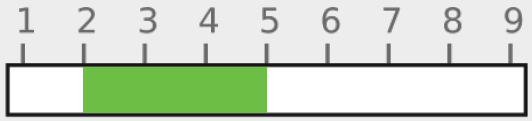
The primary goal of the proposed STTR Phase I research is to develop a low-cost, high-speed, and flexible 3D printed, miniaturized, frequency tunable, and multiband, multi-beam PAA based on graphene and ferromagnetic nanomaterials. Detailed technical objectives are listed as follows:

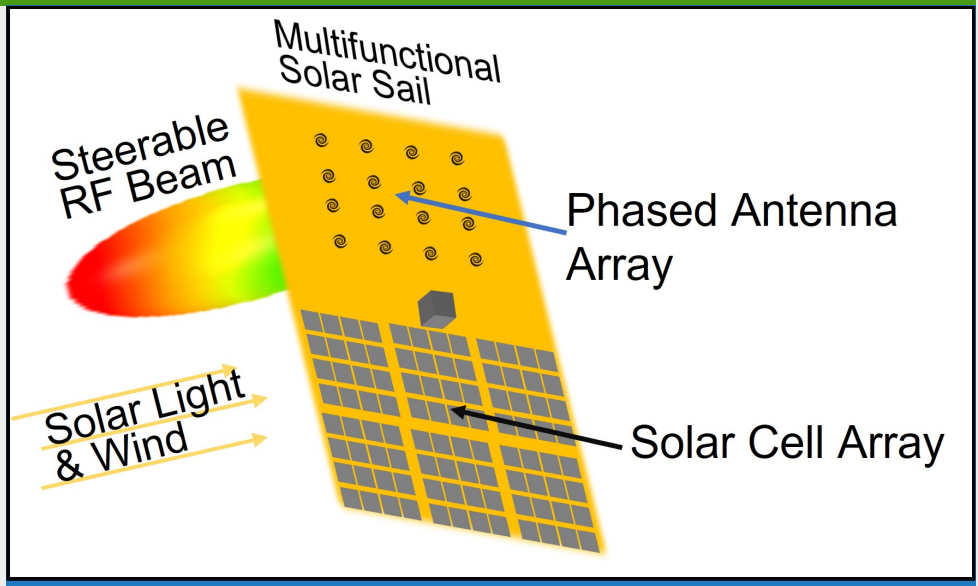
1. Demonstrate the flexible graphene field-effect transistor (FET).
2. Design, fabricate and measure an antenna element with embedded FET switches.
3. Design and fabricate a 1D 2-bit 2-element phased antenna array (PAA).

Project deliverables: Documentation of a flexible graphene FET performance. Documentation the performance of antenna element with embedded FETs. Documentation of the design and fabrication of a 1D 2-element PAA. Phase II plan.

TRL

Estimated





NASA APPLICATIONS

Deployable/stowable, compact, efficient, multiband, beam formed, light-weight, low-cost, high data-rate, and active phased array antennas are one of the enabling technologies that can suit the needs of several NASA platforms and missions. Compatible reference missions include, Mars Cube One (MarCo) and the Near-Earth Asteroid Scout (NEAScout) missions, as well as contribute to the success of human expedition to Mars and beyond.

NON-NASA APPLICATIONS

By adapting this advanced performance antenna technology to low-cost, conformal substrates, it becomes lower cost and readily adaptable to nearly any footprint. Potential direct and indirect applications include RF identification tags, smart cards, electronic paper, large area flat panel displays, multi-beam and -band 5G antenna, and White Space broadband internet antenna.

FIRM CONTACTS

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