Topic: N15A-T001

Space Information Laboratories LLC

Reliable, Safe, Lithium-ion Battery Enabled by a Robust Battery Management System
SIL is a product developer of Li-Ion batteries and avionics, and A9100C certified to design, test and manufacture these products, i.e., High Energy and Safe Li-Ion Battery with Advanced Battery Management System (BMS) for Missile, Aircraft and UAS platforms. Aerospace platforms for the Li-Ion battery technology include Aircraft (F18 and JSF), Missiles (NAVAIR, MDA and ICBM) and UASs (RQ-21, Aerosonde, MQ-8, and Small UAS). The Li-Ion Battery has an advanced internal BMS to ensure battery operational safety. Battery prognostic algorithms are used to detect a failing cell and predict when the battery is going to fail to minimize aerospace platform downtimes and reduce life cycle costs. The Li-Ion battery is designed to reduce risk by passing MIL-STD environmental tests and using highly reliable parts and materials.

Technology Category Alignment:

Advanced Electronics
Energy & Power Technologies
Weapons Technologies

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SYSCOM: NAVAIR
Contract: N68335-17-C-0081
Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0081

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2017-768

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WHO

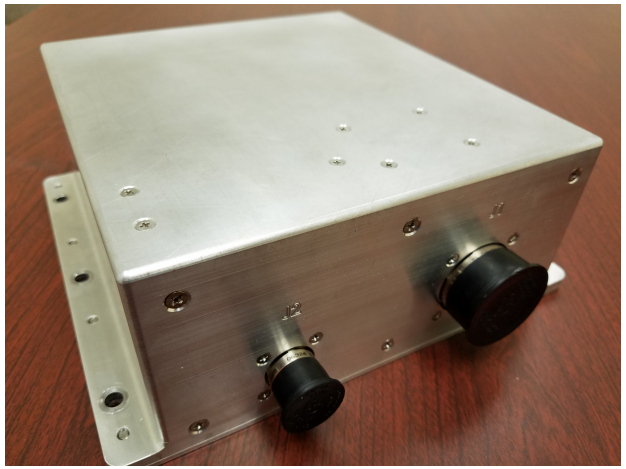
SYSCOM: NAVAIR

Sponsoring Program: PMA-262 Persistent Maritime Aircraft Systems and PMA-263 Small Unmanned Aircraft Systems

Transition Target: F18, MQ-8, Small UAS and Missiles

TPOC:
(301)342-0365

Other transition opportunities: PMA 201 Precision Strike Weapons, PMA 208 Aerial Target and Decoy Systems, PMA-242 Direct and Time Sensitive Strike and PMA



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WHAT

Operational Need and Improvement: Open, Modular, High Energy and Safe Li-Ion Battery with advanced Battery Management System (BMS) for F18, MQ-8, Small Unmanned Aircraft and Missiles. Current Lead-Acid and Ni-Cad battery systems used on the majority of Navy platforms have low energy density, large size and weight, and cannot predict when the battery is going to fail thus grounding Navy Aerospace platforms due to maintenance issues. The Li-Ion Battery with advanced BMS will have prognostic algorithms.

Specifications Required: The Li-Ion Battery with advanced BMS has the potential to be used in Navy aircraft platforms. Li-ion batteries meeting the Navy unique requirements are being developed.

Technology Developed: Open, Modular, High Energy and Safe Li-Ion Battery with advanced Battery Management System is being developed.

Warfighter Value: The Li-Ion Battery with advanced Battery Management System (BMS) is 1/7th weight and volume of Lead-Acid Battery, 1/3rd weight and volume of Nickel Cadmium Battery, and 1/2 weight and volume of Silver Zinc batteries used on majority of Navy Aerospace weapon systems to include F18, MQ-8, Unmanned Aircraft Systems and Missiles. The Li-Ion Battery advanced BMS protects, balance and monitors all individual cells within the battery. Unlike, the older battery technology (Lead-Acid, Nickel Cadmium and Silver Zinc) where you cannot predict when the battery is going to fail and/or monitor individual cell voltages, the Li-Ion Battery with advanced internal BMS can immediately detect if an individual cell within the battery is beginning to fail and also predict the Remaining Useful Life of the battery thus taking it off line prior to it failing and ensuring Navy Aerospace platforms are not grounded due to battery maintenance issues.

WHEN

Contract Number: N68335-17-C-0081 **Ending on:** September 30, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
System Requirements Review	Low	Navy and SIL agree on BMS requirements	TRL-3	January 2017
Preliminary Design Reivew	Low	Navy provided technical input on design and system requirements	TRL-4	August 2017
Critical Design Review	Med	Final design selection	TRL-5	February 2018
Li-Ion Battery SOC, SOH and RUL Algorithms developed and tested	Med	Test SOC, SOH and RUL Algorithms	TRL-6	June 2018
Qualify the battery	High	Fully develop and qualify the Li-Ion battery	TRL-6	September 2018

HOW

Projected Business Model: Space Information Laboratories (SIL) plans to manufacture the Li-Ion battery technology developed using our certified AS9100C Quality Management System. SIL's development, manufacturing and test facility is equipped for low rate production of 10 units per month. SIL is developing a high rate production plan to produce 50 batteries per month to include standing up a dedicated Li-Ion battery manufacturing facility. SIL submitted to USPTO a utility patent on our Li-Ion Intelli-Pack battery technology in 2014, and USPTO awarded a utility patent # 9,748,541 B2 for our Advanced Lithium-Ion Polymer Power System (ALPS). USPTO also awarded SIL a trademark for Intelli-Pack in 2014. SIL plans to defend our IP against any company that attempts to copy it. SIL plans to significantly penetrate the DOD, NASA and commercial market with this new Li-Ion battery technology for aircraft, unmanned aircraft systems, and missiles.

Company Objectives: SIL's objective is to secure 10 - 20 % Li-Ion battery market share for DOD Aircraft, UAS, strike weapons and missile platform applications requiring high reliability and safety to support the warfighter. Once DOD market share is secure will offer products in the commercial UAS marketplace and work to reduce Li-Ion battery cost by automating the manufacturing and test processes.

Potential Commercial Applications: DOD, NASA and Commercial Unmanned Aircraft Systems, Aircraft, Strike Weapons, Missiles and Reentry Vehicles, Robotics, Portable Power Systems for first responders, and Alternate Energy Systems. SIL's Li-Ion Intelli-Pack battery with advanced Battery Management System is greatly reduced size and weight compared to existing Lead-Acid, Nickel Cadmium and Silver Zinc rechargeable battery technologies used in the applications mentioned.

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