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Succeed with the U.S. Air Force's Small Business Innovation Research and Small Business Technology Transfer Program

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"History has taught us that big ideas come from small business..."



A technology developed by a small business, under the Air Force SBIR Program and in partnership with the Navy, is expected to help significantly reduce the maintenance hours spent conducting periodic manual inspections on aircraft, like the one happening here. See story on page 2. (Air Force photo)

VIEWPOINT

We Want YOU ... to Innovate

By David Shahady, Air Force SBIR/STTR Program Director

As stewards of Air Force investment in small businesses and their technologies we often talk about innovation. A quick Google search offers the definition of the word, "the action or process of developing a new method, idea, product, etc." What the search fails to offer is the answer to this question, "Where does innovation come from?"

As someone who has worked with innovators for the better part of two decades, I can tell you with certainty that innovation comes from ideas, inspiration, intuition and hard work. It comes from inside the innovator, or from inside an intimate team of innovators, working in real-time, inspired by an obsession and persevering to understand or change the world around them. Innovation grows from the ability to see the big picture, to understand what is driving an obsession, and using that drive to give birth to unique solutions to tough problems. Finding a solution that is unique and that people will use is where true innovation resides.

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This publication provides Air Force, DoD and other government leadership insight into the valuable contributions the SBIR and Small Business Technology Transfer (STTR) programs make to Air Force research and development activities.

The goal for the Air Force SBIR/STTR Program is to help small businesses develop and integrate affordable Air Force technologies for the air, space and cyber domains. This is accomplished through AFRL's integrated science and technology mission.

The contents of this newsletter are not necessarily the official views of, or endorsed by, the U.S. Government, DoD, or Department of the Air Force.

SPOTLIGHT ON INNOVATION

Aircraft Health Monitoring Technology Poised For Widespread Use

By Joe Cogliano

One of the world's largest aerospace companies is looking to revolutionize the industry with new technology developed by a small business in partnership with the Air Force and Navy.

UTC Aerospace Systems, a unit of United Technologies Corp., recently signed an agreement to license the MD7-Pro digital structural health monitoring system from Boston, Massachusetts-based Metis Design Corp. This newer sensing technology offers on-demand structural health data collection and analysis for aircraft components and systems. When integrated with the UTC Aerospace Systems Pulse Health Monitor, the MD7-Pro will provide an accurate and timely assessment of aircraft component life expectancy, significantly reducing the maintenance hours spent conducting periodic manual inspections.

Having this visibility into an aircraft's health will improve logistics efficiency through better planning of maintenance actions; offer better scheduling of spare parts to their point of use; and result in higher rates of aircraft readiness.

Metis developed hardware for the MD7-Pro with support from the Air Force Small Business Innovation/Small Business Technology Transfer (SBIR/STTR) Program and guidance from the Air Force Research Laboratory. Naval Sea Systems Command also has supported development of the Metis system software, including its damage detection and quantification algorithm features.

UTC Aerospace Systems secured an exclusive license to the MD7 Pro, positioning Metis for growth as the capability is adopted by military and commercial customers. For Metis, the license will provide funding for many years to come, which can be used to improve the technology and pursue research in other areas, such as multifunction materials.

"Of most importance, however, it gives us real credibility," said Dr. Seth Kessler, president and CEO of Metis. "A technology we invented and developed from scratch is now going to be commercially produced and used in programs of record, which will help us secure future projects and funding."

While the Air Force and Navy have been supporting this effort for years, their more recent investments to transition the technology to programs of record helped attract the interest of UTC Aerospace Systems, Kessler added.

UTC Aerospace Systems is enhancing the MD7-Pro system to enable aircraft structure checks in less than five minutes, thereby reducing manual inspection time and cost while maximizing fleet availability. Kevin Hawko, Vehicle Health Business Development Manager for UTC Aerospace Systems, said the new system will be capable of identifying crack size and location, loose fasteners and corrosion. The fully integrated system will provide high quality data through digitizing sensor signals at the point of measurement.

Versatility is one of the keys to MD7-Pro digital structural health monitoring system, as it can be integrated into new aircraft designs or retrofitted into existing aircraft. The system allows repeatable, highly accurate evaluation of aircraft structural health, even in hard to reach areas. For the system to be practical, it had to be able to acquire data at very high sampling rates and be networkable over large distances while still being compact.

In addition to its newfound commercial potential, the Metis technology behind MD7-Pro is being transitioned to the C-5 program through cooperation between the Air Force Sustainment Center and Air Force Life Cycle Management Center.

During this process - with funding from the Air Force SBIR Commercialization Readiness Program - Metis is working to mature, integrate and test the structural health monitoring system on the C-5. Those tasks will focus on sensor placement optimization and the algorithm calibration for these locations; a probability of detection assessment; an airworthiness assessment; and demonstration of the integrated system.

"The biggest benefit of the SBIR program is provide funds and be a champion for new technologies that otherwise would not be investigated, researched or funded by the program offices because of higher priority projects," said David Wilkinson, C-5 ASIP manager.

TRANSITION

Air Force Small Business Industry Day Ventures Into Space

Representatives from nearly 150 small businesses recently descended on the Air Force Space and Missile Systems Center in Los Angeles, California to make connections with the Air Force and major defense contractors. In October, the center hosted a Small Business Industry Day (SBID) sponsored by the Air Force SBIR/STTR Commercialization Readiness Program.

The event focused on small business capabilities and opportunities, matching stakeholders from both large and small business communities with program executive offices at the center such as the Global Positioning Systems Directorate, the Range and Network Division, the Remote Sensing Systems Directorate, the Space Superiority Systems Directorate, and the Advanced Systems and Development Directorate. Representatives from Boeing, Harris, Lockheed Martin, Northrop Grumman, Raytheon and SAIC were among the major defense contractors in attendance.

SBID's are designed to be high-visibility events that benefit the Air Force by fostering partnerships and increasing small business participation in government programs. They also bolster small businesses, which tend to have limited resources and may not otherwise have the ability to meet with Air Force personnel and major defense contractors.

Mark Teskey, director of Air Force Small Business Programs, was a keynote speaker at the event as well as David Shahady, Air Force SBIR/STTR program director, and Jim Sweeney, program manager of the Air Force SBIR/STTR Commercialization Readiness Program.

Other speakers included Brigadier General Mark Baird, vice commander of the center, and Cordell DeLaPena, director of the Program Management and Integration Directorate at the center.

During the event, small businesses were given access to briefings from – as well as the opportunity for closed-door meetings with – Air Force technology subject matter experts and major defense contractors. Nearly 100 one-on-one meetings took place and half of those sessions were related to SBIR technologies. The SBID also provided an exhibit hall that included 45 booths from industry and the Air Force.

This was the first SBID at Space and Missile Systems Center and the fourth supported by the Air Force SBIR/STTR Commercialization Readiness Program. It marked the largest attendance at SBID to date, with nearly 350 total attendees.

With these growing numbers, SBID's are proving to be a great way to reach a wide variety of Air Force partners and potential partners. Almost a quarter of the small businesses in attendance were not yet performing work for the Air Force.

The next SBID is tentatively planned for summer 2017 in conjunction with the Air Force Test Center. Updates on all SBID events are posted here: <https://conference.brtrc.com/AFSBID/>.

New Instrument Shows Big Potential To Help Mission Planners

By Joe Cogliano

An innovative scanning technology developed by a Colorado-based small business may eventually save lives and boost the success rate of military missions.

Funding from the Air Force Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program helped Atmospheric and Space Technology Research Associates – also known as ASTRA – to create a new instrument to pinpoint atmospheric problems that impact communication and navigation signals. This compact smart-scan mirror provides near real-time detection of “bubbles” in the Earth's upper atmosphere, which can interfere with radio signals used by the Department of Defense.

Armed with the data, military planners could avoid performing operations in areas where the irregularities are occurring.

Current technology cannot be used to predict bubbles in the ionosphere or provide real-time measurements with adequate precision. While imagers aboard Department of Defense weather satellites are available, for example, they are limited to coverage in the evening hours and only provide images at 100-minute intervals.

The goal of this Air Force SBIR project was for ASTRA to develop a smaller and more versatile instrument that can produce images of the nightside ionosphere by viewing ultraviolet light emanating from the atmospheric gases.

Also known as SIPS, for Scanning Imaging Photometer System, the new instrument consisted of a UV detector and a scan mirror. A similar concept has been flown on other satellites. However, each of those imagers was large, expensive and had

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a single simple scan-mirror mode, which was continuously repeated, so the signal was weak and overcome by background noise in areas of low ultraviolet intensity.

One of ASTRA's advancements with this project is that SIPS is significantly smaller, lighter and cheaper than instruments flown previously, and requires only about a tenth of the power, so that it can easily be placed on small satellites called cubesats. A small group of SIPS-carrying cubesats could provide almost continuous imagery of the irregularities that cause poor UHF-based satellite communications and GPS positioning outages that can endanger lives in combat situations.

Another achievement of the project was the creation of a mirror with multiple scan modes. This allows useful measurements, even in low-signal regions of the Earth's ionosphere. The signal-to-noise ratio of SIPS is also about 10 times better than current technology, so structures in the ionosphere can be more readily identified. Additionally, the plug-n-play interfaces on SIPS trim months from the integration and test process of traditional satellite systems.



U.S. AIR FORCE

While this concept may seem simple, entrepreneurs and innovators know there is more to it than that. This is where establishing a relationship with us provides guidance, opens doors and presents opportunities.

2016 was a flagship year for the Air Force's Small Business Innovation Research and Small Business Technology Transfer Program as it continued to help domestic, high-growth entrepreneurship take root in defense and commercial technology marketplaces. In 2016, we invested around 300 million dollars in hundreds of U.S. small businesses to make those ideas and passions a reality. Whether we met small businesses on our ambitious SBIR Road Tour, introduced ourselves and engaged with them through social media, or tapped pre-existing relationships with small domestic high-tech businesses with new ideas to explore, we've connected to face tremendous challenges, create solutions and achieve success.

This is an exciting season for the SBIR program as the Department of Defense opens its broad agency announcement to even more entrepreneurs and innovators on January 10. This announcement provides small businesses with an opportunity to receive funding and guidance towards achieving their big ideas. From finding a variable pressure and low control nozzle for firefighting, to a repair for F-16 landing gear bushing bores, to electroplating 3D printed materials and more, we know that the solutions to meet Air Force needs and challenges are within arms' reach and reside in the minds and hearts of U.S. small businesses.

History has taught us that big ideas come from small business, and that's why I invite you to review and propose your ideas here <https://www.sbir.gov/node/1206543> and here <https://www.sbir.gov/node/1206545>. The historic Uncle Sam posters said it best, "We want you." Moreover, we want to provide you with the resources you need to do what you do best, INNOVATE!

WINTER EVENTS

Conferences, workshops and exhibitions of interest to SBIR/STTR personnel and program participants

SBIR/STTR Grant Writing Workshop

24 January | Chicago, IL

<https://www.eventbrite.com/e/sbirsttr-grant-writing-workshop-jan-2017-registration-27053187813>

Regional SBIR/STTR Summit

23 March | Tucson, AZ

<http://www.techparks.arizona.edu/azvi>

National Society of Black Engineers National Convention

29 March - April 2 | Kansas City, MO

<http://convention.nsbe.org/>