



FY 2018 YEAR IN REVIEW



U.S. AIR FORCE
SBIR-STTR

Connecting the Air Force to Small Business

PARTNER WITH US TODAY
[HTTPS://WWW.AFSBIRSTTR.AF.MIL](https://www.afsbirsttr.af.mil)



FY2018 REVIEW

Table OF Contents

Message from the Program Director	2	FY 2018 Success Stories	43
Our Leadership	4	Commercialization Readiness Program	59
Air Force Participating Organizations	5	Breakdown of Funding Leveraged	60
Program Oversight	6	Technology Transition Plans	61
SBIR STTR Program Management Office	7	FY 2018 Transition Successes	63
Total Air Force SBIR STTR Funding	8	Small Business Industry Days	68
The Year in Review	9	Technology Interchange Meetings	69
Overview of 2018	10	SBIR STTR Topics and Awardees	70
Program Improvement Initiatives	11	Special Topics and Partnerships	71
SBIR TAP	12	Air Force Contracting Sprint	74
Interagency Agreement with GSA	16	Air Force Pitch Day	75
Tech Warrior Enterprise	17	SBIR STTR Budgets	76
AFRL Small Business Hub	30	SBIR 2018.1 Topics	77
Marketing and Communications	31	STTR 2018.A Topics	79
Small Business Outreach Events	32	SBIR 2018.2 Topics	80
SBIR STTR Hotline	33	STTR 2018.B Topics	84
Our Social Media	34	SBIR 2018.3 Topics	85
2018 Videos	36	STTR 2018.C Topics	86
Program Website	42	FY 2018 Topic Award Selectees	87



FROM THE Program Director

The Air Force Small Business Innovation Research | Small Business Technology Transfer Program made several monumental and transformative moves in FY 2018. In fact, parts of the program might be unrecognizable to those familiar with the program's previous direction and legacy. The statutory fundamentals haven't changed much, but our radical new "venture capital arm of the Air Force" approach to SBIR | STTR is already paying huge dividends as we move at the speed of innovation into 2019.

Two exciting and foundational events that facilitated program success in FY2018 included: Congressional reauthorization of SBIR | STTR administrative funds, and a nearly doubled SBIR | STTR budget. Yes, doubled! These changes provided resources the SBIR | STTR program has never had before. This budget is allowing us to be strategically creative and explore the boundaries of what the SBIR | STTR program can do for small businesses, the Air Force mission, the Department of Defense warfighter, and our country as a whole. We're confident that combining our forward-thinking, aggressive, and entrepreneurial management team with the new authorization and budget establishes an algorithm for success and that will yield awe-inspiring results.

While the program forged forward on some new paths, it also stayed the course in the traditional ways of doing business. For example, the Air Force SBIR | STTR program participated in all three DoD SBIR | STTR Broad Agency Announcements, resulting in hundreds of contracts to small businesses. The Air Force Commercialization Readiness Program continued to support maturation and transition of SBIR- and STTR-developed technologies, and conducted Small Business Industry Days and Technical Interchange Meetings with major defense contractors. The program also continued deployment of a new information technology infrastructure, and reached out to stakeholders through a rigorous communications and marketing effort. In short, we didn't abandon tradition – we nurtured it while trying new things within the traditional process, while implementing atypical methodologies and business processes.

Where it gets really exciting is that in FY 2018, the program implemented "open innovation" topics as a means of increasing reach, especially to non-traditional small businesses, program offices, investment partners, major defense contractors, and DoD "technology accelerators." Alongside our many partners, we conducted multiple "experimental" processes designed to explore reducing the time-to-contract and increasing exposure to a larger, more diverse, and practical small business community. The results to-date are beyond encouraging, and I'm convinced we are on the verge of establishing new process norms that will reduce contracting times, increase technology relevance, lead to more viable businesses in the economy, and result in huge contributions to the national defense agenda.

When I write this introduction next year, I anticipate a glowing report on the pending, but imminent, Air Force SBIR | STTR Center of Excellence, where we will house all our contracting, financial, and program management activities under one roof; the results of our 2019 "Pitch Day" activities, where we will be prototyping one-page Phase I contracts and on-the spot awards; and other nascent activities.

Executing a program of this size and complexity poses unique challenges, but with the help of prudent legislation, strong leadership support, energetic partners, and a powerful team of deep thinkers, the Air Force SBIR | STTR program is making the changes needed to maximize its contribution to national security, the well-being of our warfighters, and the success of the entrepreneurial small business community. Preserving momentum and realizing outcomes that benefit program participants and stakeholders are, as always, paramount in our hearts and minds as we execute the program each day and into the future.



David Shahady
U.S. AIR FORCE SBIR | STTR PROGRAM DIRECTOR

Research and development are major factors in the growth and progress of industry, for large and small businesses. However, the expense of running a serious R&D program is beyond the means of many small businesses, placing them at an immediate competitive disadvantage.

The Small Business Innovation Research and Small Business Technology Transfer programs provide high-risk funding that helps even the playing field for small companies focused on cutting-edge technology.

Initially, the small R&D business is offered the opportunity to compete for federal research contracts. This benefits the Air Force by allowing the best ideas to surface.

At the end of the contract, successful SBIR | STTR efforts may generate additional opportunities for small businesses to commercialize their project's results, and attract additional funding from non-SBIR | STTR sources, while lowering the risk for interested private investors with a proven technology.

Each year, hundreds of U.S. small businesses obtain public and private sector contracts as a follow-on to their federally funded SBIR or STTR effort, and many of these were originally Air Force or Department of Defense contracts.



Congress established the SBIR and STTR programs several decades ago to foster innovation among small U.S. businesses that focused on the needs of federal agencies. The programs are administered by the Small Business Administration (SBA).

AIR FORCE SBIR/STTR STANDARD TOPICS



AIR FORCE SPECIAL TOPICS

There are three phases to SBIR and STTR; Phase I, Phase II and Phase III. The time frame for a Phase I contract is less than a year and Phase II contracts are typically for nine months to two years. The Air Force SBIR | STTR budget includes Phase I and Phase II contracts as well as extensions or enhancements to current Phase II efforts.

Phase III contracts are not part of the annual budget since, by law, they must be funded with non-SBIR dollars. The goal for the Phase III contracts is to find external funding, whether from the Air Force or other federal agencies, as well as funding from private sources, such as major defense contractors.

Our Leadership

OFFICE OF THE ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION

Dr. William Roper

Assistant Secretary of the Air Force for Acquisition,
Technology, and Logistics

AIR FORCE SMALL BUSINESS PROGRAMS

Valerie Muck

Director, Air Force Office of Small Business Programs (OSBP)

Jeffrey Stanley

Deputy Assistant Secretary of the Air Force Office
for Science, Technology, and Engineering

Neville Thompson

Air Force SBIR | STTR Program Element Monitor

AIR FORCE TECHNOLOGY EXECUTIVE OFFICER

Maj Gen William T. "Bill" Cooley

Air Force Research Laboratory (AFRL) Commander

AFRL SMALL BUSINESS (SB) OFFICE

William Harrison III

Director

AIR FORCE SBIR|STTR PROGRAM OFFICE

David Shahady

Program Director

Heather Gudorf

Operations Manager and Deputy Director

James Sweeney III

Commercialization Readiness Program (CRP) Manager

Oswaldo Delacruz

Infrastructure Manager

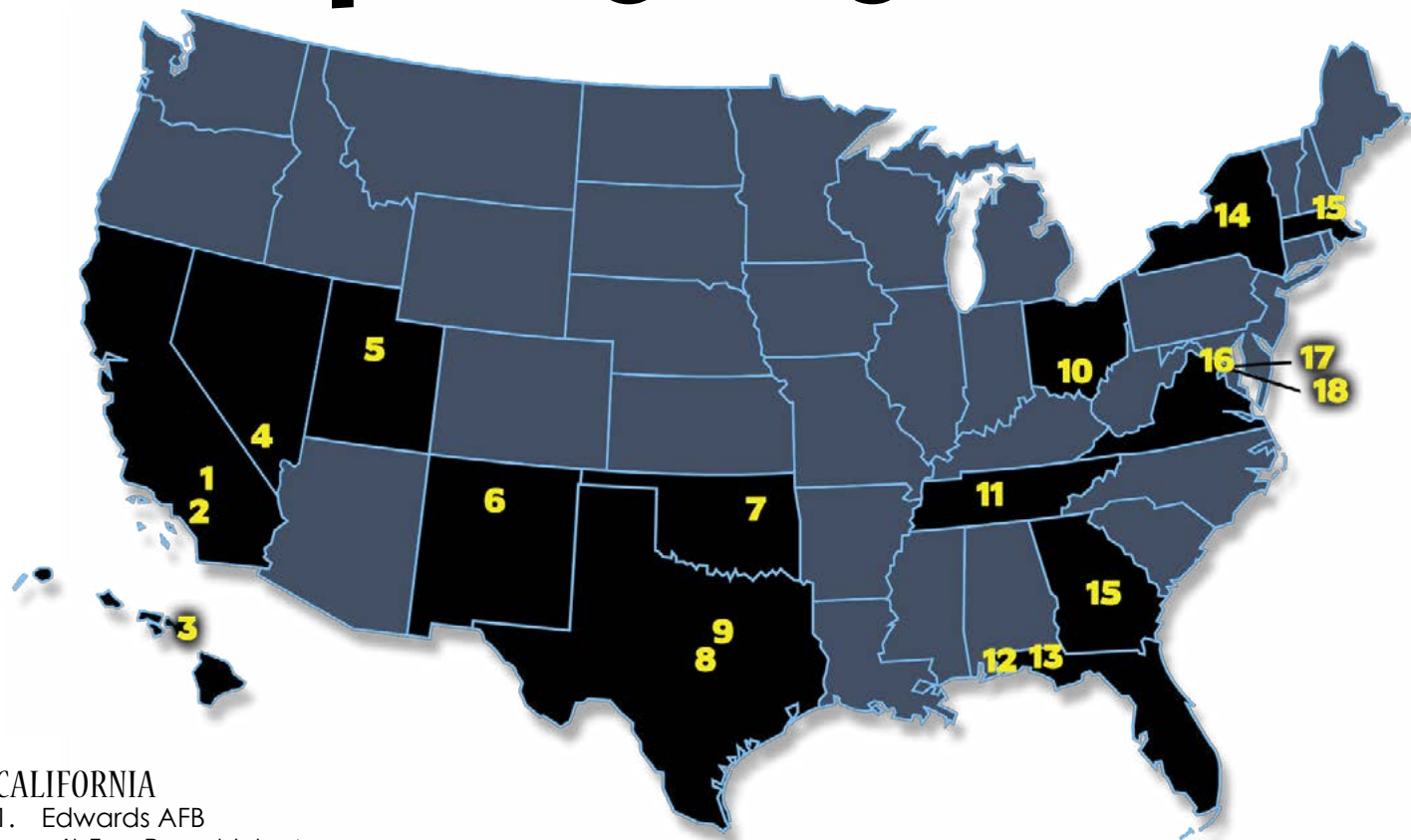
Rupak Shah

Financial Manager

Michelle Tritt

Contracting Officer

AIR FORCE Participating Organizations



CALIFORNIA

1. Edwards AFB
Air Force Research Laboratory
Air Force Flight Test Center
2. Los Angeles AFB
Space & Missile Systems Center

HAWAII

3. Maui
Air Force Research Laboratory

NEVADA

4. AFWERX

UTAH

5. Hill AFB
Air Force Sustainment Center

NEW MEXICO

6. Kirtland AFB
Air Force Research Laboratory
Air Force Nuclear Weapons Center

OKLAHOMA

7. Tinker AFB
Air Force Sustainment Center

TEXAS

8. Lackland AFB
Air Force Surgeon General
Air Force Civil Engineer Center

9. AFWERX

OHIO

10. Wright-Patterson AFB
Air Force Research Laboratory
Air Force Life Cycle Management Center

TENNESSEE

11. Arnold AFB
Air Force Test Center

FLORIDA

12. Hurlburt Field
Air Force Special Operations Command
13. Eglin AFB
Air Force Research Laboratory
Air Force Life Cycle Management Center
Air Force Test Center

NEW YORK

14. Rome
Air Force Research Laboratory

MASSACHUSETTS

15. Hanscom AFB
Air Force Life Cycle Management Center

VIRGINIA

16. Arlington
Air Force Research Laboratory
F-35 Joint Strike Fighter

WASHINGTON D.C.

17. AFWERX
18. MD5

GEORGIA

19. Robins AFB
Air Force Sustainment Center

PROGRAM Oversight

Small Business Administration (SBA) – is the assigned Federal administration responsibility for the SBIR | STTR programs. The SBA develops and issues the SBIR and STTR policy directives, setting forth policy for the general conduct of the programs within the Federal Government.

DoD Office of Small Business Programs (OSBP) – is responsible for the overall management of the DoD SBIR | STTR Programs. The DoD SBIR | STTR Program Office is responsible for interfacing with the services, defense agencies, SBA, and Congress regarding SBIR | STTR.

SAF/AQ – appoints the AFRL commander as the Technology Executive Officer (TEO) and serves as the Air Force focal point for scientific and engineering integrity for the Secretary of the Air Force, Chief of Staff of the Air Force, and other Headquarters Air Force elements.

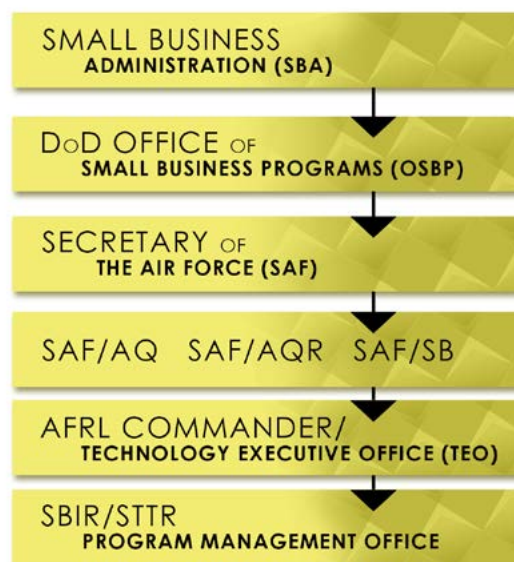
SAF/AQR – serves as the Air Force Science & Technology (S&T) Executive to represent, advocate, and defend the Air Force S&T Program to the Office of the Secretary of Defense (OSD), the other services, and Congress. Serves as the SAF/AQ primary interface to the TEO.

SAF/SB – monitors the Air Force SBIR | STTR Program and leverages program results and relevant technologies developed by small businesses, to meet prime and subcontracting goals, when appropriate.

AFRL/CC, TEO – oversees the execution of Air Force SBIR | STTR Program. Develops and approves all SBIR | STTR topic allocations and topic selections, and ensures topics comply with OSD criteria/guidance and meet recognized Air Force mission capability needs and technology opportunities consistent with documented capability needs.



The Air Force SBIR|STTR Program Management Office reports to the Air Force's Technology Executive Officer (TEO) and to the Secretary of the Air Force's Science, Technology and Engineering Directorate (SAF/AQR). Due to the TEO's role as the AFRL commander, the program's senior managers are assigned to the AFRL Small Business Office at Wright-Patterson Air Force Base (WPAFB), Ohio.



THE SBIR | STTR Program Management Office

David Shahady is the director of the Air Force SBIR | STTR Program. He directs a research budget of more than \$670M focused toward qualified small businesses in the nation's high-tech arena. Through a competitive awards-based program, he manages nearly 1,000 contract efforts sponsored by over 50 Air Force organizations from across the nation. He also enables small businesses to explore their technological potential and provides the incentive to profit from commercializing their technology.



Heather Gudorf is the Air Force SBIR | STTR Program's operations manager and deputy director. Her primary responsibilities include financial strategy and planning, process improvements and documentation, and facilitating the daily operation of the SBIR | STTR broad agency announcement process.



James Sweeney III is the program manager for the Air Force SBIR | STTR Commercialization Readiness Program. His responsibilities include direction of the research transition budget focused on qualified small businesses in the nation's high-tech arena, a critical source of innovative technologies for air, space and cyberspace forces.

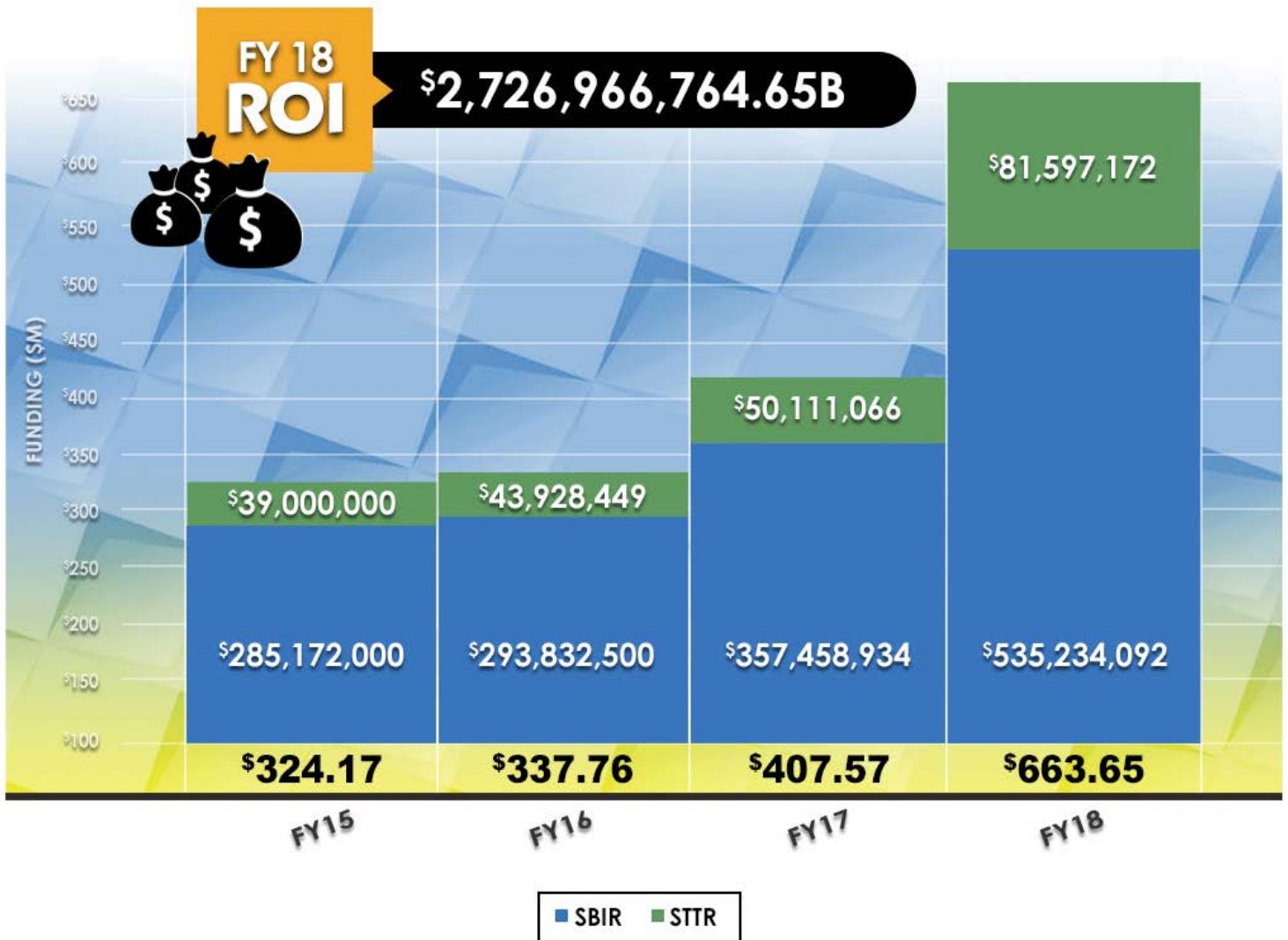


Oswaldo Delacruz is the Air Force SBIR | STTR Program infrastructure manager. His responsibilities include management of information technology services to maintain a state-of-the-art infrastructure that ensures program efficiency and reduces cyber threats.



FY 2015 - FY 2018

Total Air Force SBIR|STTR Funding



\$4.65B Phase III dollars since FY 15

\$2.7B in FY 18

THE **Year in Review**

The Air Force received 3,544 proposals for 316 SBIR topics in FY 2018 (SBIR 2018.1, 2018.2 and 2018.3). In FY 2018, 291 Phase I and 315 Phase II contracts were awarded.

The Air Force received 316 proposals for 37 STTR topics in FY 2018 (STTR 2018.A, 2018.B, 2018.C). 61 Phase I and 42 Phase II contracts were awarded.



Overview of 2018

The Air Force discontinued several new initiatives as a result of the lack of SBIR | STTR Administration Pilot funding, which provided an additional three percent in administrative funding for SBIR federal agencies, in FY 2018. Critically impacted programs included participation in the Small Business Administration's SBIR Road Tour and SBIR | STTR conference events, manning of the Air Force SBIR | STTR information hotline, and fraud countermeasures.

Near the end of FY 2018, Congress reauthorized the Administration Pilot Funding. The Air Force began to reinstate the impacted programs in FY 2019.

In FY18 the Air Force continued to use the administration funding it had for the following:

- Outreach
- Streamlining and simplifying processes
- Reporting (administrative, congressional and interagency)
- Commercialization
- Support for technology demonstrations, testing
- Modernizing the Air Force SBIR | STTR program's information technology infrastructure



The Air Force program operates on a congressionally mandated percentage of the Air Force's extramural Research/Research & Development (R/R&D) budget as established by the SBIR and STTR policy directives. This amounted to roughly \$670M for FY2018.

PROGRAM **Improvement Initiatives**

Although the Air Force discontinued several initiatives as a result of the lack of SBIR | STTR Administration pilot funding the Air Force continued to use the funding it had to support a variety of initiatives.

Near the end of FY 2018, Congress reauthorized Administration Pilot Funding and measures to reinstate impacted programs began.



SBIR TAP

The program, a joint effort between the Air Force, the Air Force Research Laboratory, Wright Brothers Institute and The Entrepreneurs Center, was launched as a pilot in FY 2015 and is provided at no cost to participants.

SBIR TAP addresses technologies of interest both to AFRL and to general commercial market segments including:

- Advanced Manufacturing
- Big Data: data warehousing, management, analytics
- Cyber Security
- Energy: storage and generation
- Environmental Monitoring
- Health Care
- Human Performance Enhancement: sense, assess, augment
- Internet of Things
- Personalized Learning
- Precision Agriculture
- Automated Transportation

The program was designed to minimize the burden on small businesses. Each interested small business participates in a 30-minute interview with commercialization experts providing them with an overview of their technology and their current level of commercialization experience. Final selection of participants is made by a panel of commercialization experts and the Air Force SBIR Program Management Office based on the following criteria:

- Alignment of the small business research with Air Force SBIR TAP technology commercialization focus areas;
- Assessment of the commercialization potential of the SBIR technology; and
- Small business willingness and ability to attend and actively engage in the program.



The Air Force Small Business Innovation Research Technology Acceleration Program (SBIR TAP) selects a group of small businesses that have received Phase I SBIR|STTR contracts from the Air Force. It supports these businesses in assessing the commercial viability of their technology, creating actionable commercialization plans, seeking investment capital, and in better preparing commercialization plans should they seek further Air Force funding through a SBIR Phase II request.

SBIR TAP provides approximately 25 to 30 SBIR Phase I contract recipients with a customized support program. Participants use visual tools and models structured around nine key commercialization questions to identify the business value inside a science or technology innovation.

During the program itself, participating companies attend a total of 16 hours of training over the course of four consecutive weeks (four hours per week). Those work sessions consist of engaging, fast-paced and relevant individual and group work sessions, facilitated by certified instructors. The sessions, both individually and collectively, provide participants with foundational skills including business model development, market and competitive research, technology/market alignment, and value proposition creation.

For a six-month period following the in-person training, commercialization support staff spend extensive, one-on-one time with each of the participating companies to help identify their commercialization milestones, overcome barriers, and in making connections to partners that can help them achieve their commercialization objectives. In this way, each SBIR TAP participant experiences a program tailored to their specific needs – and allows commercialization assistance to continue after their Air Force SBIR contract formally ends.

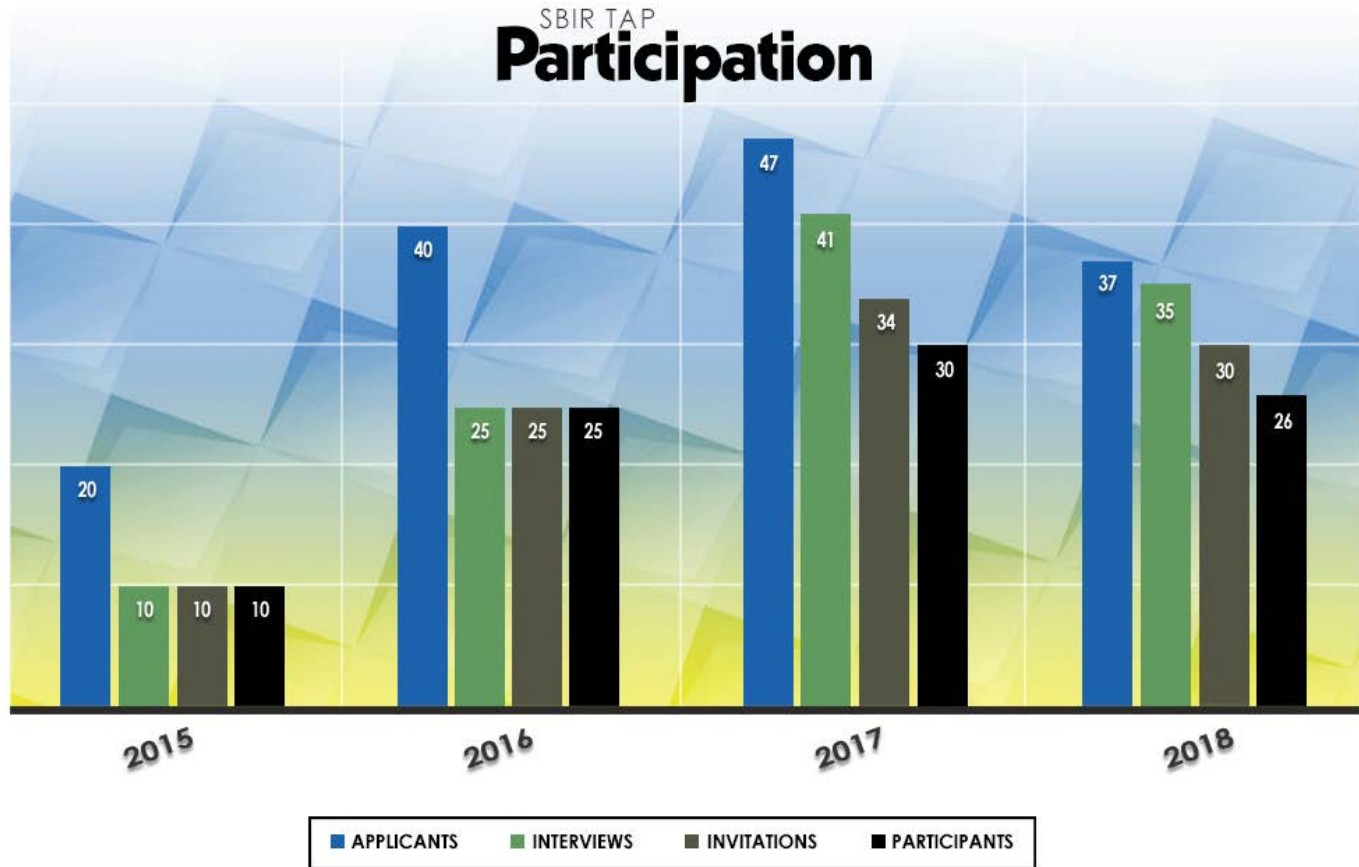
Now in the program's third year, 26 companies participated in SBIR TAP. Companies attended training sessions in Denver, Colorado, Washington DC, and Dayton, Ohio, and are currently engaged in follow-on processes with program support staff.

To date, participating companies have raised \$8.6M in follow-on investment (angel or venture funding), and those seeking a Phase II SBIR have an 87 percent success rate.

As part of the FY 2018 SBIR TAP, TEC and WBI were tasked with developing a brand identity for the collection of programs utilized by the Air Force to foster commercialization of internal and external technologies that support the warfighter. That task was completed, and the logo, typography and associated brand usage guidelines were delivered to the Air Force in August of 2018. A representation of that brand name, logo and typographic treatment is below:



For more information, visit: <https://www.afsbirsttr.af.mil> and search for SBIR TAP; or, <http://www.tec-tap.com/sbir-tap/>.



Participating companies have raised
\$8.6M in investment to date
 Companies seeking Phase II have an
87% success rate

FY2018 SBIR TAP Participants

SBIR Awardee	City State	Technology Summary
ACTA, Inc.	Torrance CA	IT-based consequence assessment modeling and simulation for protection and lethality applications
American Boronite Corporation	Burlington MA	Carbon nanotubes for use in plasma torch applications
ATA Engineering, Inc.	San Diego CA	Flexible software toolset for accurate prediction of high-speed wind tunnel transient airloads
Colorado Engineering, Inc.	Denver CO	Novel missile fuselage design and manufacturing process
Cornerstone Research Group	Dayton OH	Low-cost, ultra-long endurance UAV for suitable intelligence, surveillance and reconnaissance (ISR) missions
Cornerstone Research Group	Dayton OH	Modular, wearable instrument for measuring total health exposure (THE)
Cornerstone Software Solutions, Inc.	Orlando FL	Software to simulate dynamic sensor output for use in virtual training scenarios
Creare, LLC	Hanover NH	High-speed friction stir weld to repair/resurface aircraft
Emergent Space Technologies, Inc.	Laurel MD	GMSEC-JMS bridge operational applications (software allowing dissimilar satellite control stations to communicate and coordinate)
Global Circuit Innovations	Colorado Springs CO	Microchip harvesting/reconditioning/reuse to reduce manufacturing cost
Gradient Consulting, LLC	Newport News VA	Novel UAS concept - central payload, radial structures providing lift - allowing for near-persistent flight
Innovaveering, Inc.	Ronkonkoma NY	Harsh environment sensor (ultra-high pressure, ultra-high temperature)
Luna Innovations, Inc.	Atlanta GA	Sensor system embedded in complex systems (aircraft, buildings) to predict and manage corrosion
Magzor Corporation	Westlake Village CA	SOSA Compatibility interface solution - "plug and play" sensor integration in retrospective and prospective platforms
Materials Resources, LLC	Dayton OH	Additive manufacturing of high performance metals (titanium)
MicroLink Devices, Inc.	Niles IL	Low-cost solar cell with current performance parameters using nanomaterials
MolyWorks Materials Corporation	Las Gatos AL	Biomimicry for landing gear design constructed using additive manufacturing
Physical Sciences, Inc.	Andover MA	Handheld hyperspectral imager with no gaps in detected spectrum
Praeses, Inc.	Shreveport LA	Dynamic modeling of software (taxonomy, structure, function) across legacy systems
SciMeasure Analytical Systems, Inc.	Decatur GA	High-performance scientific CCD and CMOS camera
Secmation, LLC	Raleigh NC	Cyber protection for RF chip sets
TiaLinx, Inc.	Irvine CA	Integrated radiometry sensor/AI system to allow UAS to autonomously operate
Total Quality Systems, Inc.	Roy UT	Intermittent fault detection in complex electronic circuit paths
Trideum Corporation	Huntsville AL	Software to aggregate and standardize flight simulation systems across the Air Force
TRX Systems, Inc.	Greenbelt MD	Asset tracking in a GPD-denied environment (most specifically, in buildings)
Vlabs, Inc.	Norcross CA	Big Data Cyber Analytics - Method to analyze broad spectrum of cyber signals

Interagency Agreement with GSA

The Air Force has a new tool in its ongoing effort to accelerate Small Business Innovation Research-developed technologies to the warfighter.

Air Force SBIR|STTR Program Director David Shahady signed an interagency agreement with the General Services Administration to perform Phase III contracting. This allows organizations throughout the Air Force, as an alternative, to obtain Phase III assisted acquisition services support from GSA on a fee-for-service basis.

A key feature of SBIR|STTR Phase III is the ability to award a sole-source contract to a small business for technology it has already developed under the program. By law, competition requirements are satisfied when a business receives a Phase I and/or Phase II contract award.

Phase III funding, which comes from sources outside of SBIR|STTR, can go toward accelerated development and integration of SBIR|STTR technologies. Under this new interagency agreement, Air Force organizations may obtain GSA assistance to award and administer a Phase III contract with any eligible small business regardless of which agency sponsored the Phase I and/or Phase II efforts.

It is not applicable to STTR topics.



Air Force SBIR|STTR Program Director David Shahady (left) and GSA Great Lakes Region FAS Regional Commissioner Kim Brown. The two recently signed an interagency agreement for GSA to perform Phase III contracting. This allows organizations throughout the Air Force, as an alternative, to obtain Phase III assisted acquisition services support from GSA on a fee-for-service basis. (Photo by Dennis Stewart, Contractor, Air Force SBIR|STTR Program)



"GSA is honored to assist the Air Force in meeting its mission by providing additional contracting options for SBIR Phase III contracts. We understand the importance of the SBIR program to our warfighters and to our nation's economy and we are glad to have the opportunity to assist."

— Kim Brown

GSA Great Lakes Region Federal Acquisition Service Commissioner



TECH WARRIOR Enterprise

The Air Force Small Business Innovation Research and Small Business Technology Transfer Operational Experimentation and Demonstration Pilot (termed the Tech Warrior Enterprise) became part of a year-round enterprise, which was administered by Wright State Research Institute's National Center for Medical Readiness in Fairborn, Ohio in FY 2018. The official launch of the enterprise took place December 9, 2017.

The traditional Operation Tech Warrior continued as the capstone event while two other programs, Tech Warrior OPS and Tech Warrior CONNECT, became available to assist small businesses as part of an expanded Tech Warrior Enterprise.

Held annually in September, Operation Tech Warrior combines combat simulations with technology integration and demonstrations. The event allows Air Force Research Laboratory scientists and engineers to observe, and sometimes even step into the warfighter role, while small businesses gather feedback from their AFRL peers and push the limits of promising new systems by integrating them in a relevant setting.

Similar in nature, the new Tech Warrior OPS events are held at the center, or at strategic offsite locations, alongside warfighters, special operators, and first responders who were conducting training and exercises. These communities provided small businesses with opportunities to ask questions, gather specific data by interviewing the operators, and to integrate their technologies with training scenarios. Multiple small businesses and user communities participated in these events.

Tech Warrior CONNECT is a year-round program that places technology from small businesses into the hands of potential users. This demonstration environment is tailored to suit individual small business needs.

The idea behind the Tech Warrior Enterprise is to accelerate critical tools and solutions developed by small businesses to the warfighter. For small businesses, it provides a proving ground and fosters long-term relationships with potential end-user groups to better posture technology for commercialization and transitions.

Any small businesses with an Air Force research and development contract, especially those involved in the Air Force SBIR | STTR Program, were able to participate in the Tech Warrior Enterprise by working with its government contact or by contacting twenterprise@wright.edu, and participation in Tech Warrior events were free for companies, which only pay for travel expenses.



"The Air Force SBIR|STTR Program and its small business partners strive for advancements that support warfighters across the Department of Defense and meet near-term critical needs while filling the pipeline with potential game-changing technologies. In stressing innovation over invention, the program works to drive down costs, get the best new technology to the warfighter and boost the economy through small business growth."

— **David Shahady,**
Air Force SBIR|STTR
Program Director

The Scope

Tech Warrior Enterprise pushes the limits of promising new technologies by allowing companies with technologies that are relevant to the Department of Defense to demonstrate, integrate and test in a relevant setting. It also offers the opportunity for Air Force SBIR | STTR stakeholders, supporting organizations and partners to see technology demonstrations and testing in action. Technology evaluation resulting from Operation Tech Warrior Enterprise is used by the Air Force SBIR | STTR Program Management Office to align emerging developments and products with appropriate customers, sponsoring and managing organizations, stakeholders, and to provide funding strategically and accordingly where a "technology pull" is present.

To this end, in FY 2018, Tech Warrior Enterprise also became a testing ground for future investment strategy practices. The Air Force SBIR | STTR Program developed a Tech Warrior Participant review board that included operators, technology analysts, center program managers, the Commercialization Readiness Program manager, and others.

Additionally, the events included participation from non-SBIR | STTR businesses, which allowed administrators of the program increased stewardship of the SBIR | STTR process/opportunity via Broad Agency Announcements/topics. That stewardship also extended to customer communities who were introduced to small businesses capable of filling gaps, and meeting requirements.

The goals of program activities were as follows:

- Provide opportunities for small businesses to test, experiment, conduct data collection, insert, showcase, or demonstrate state-of-the-art warfighting technologies in a realistic operational environment;
- Encourage failure as an opportunity for critical feedback, technology advancement (to include advancements in technology readiness levels);
- Identify small businesses with mission-critical technologies that align with warfighter needs, requirements and technology gaps, and to begin planning and alignment of strategic future investment opportunities to meet those.
- Identify small businesses' common pain points or concerns (tooling, manufacturing, customer identification, etc.) for the purposes of future Air Force SBIR | STTR Program infrastructure/administrative investment;
- Provide peer-to-peer feedback from Air Force Research Laboratory "warriors" (scientists, engineers, etc.);
- Provide customer/user feedback from individuals or teams with combat deployment, special operations, security forces, first responder experience; and
- Provide instruction and feedback from Department of Defense leadership, SBIR | STTR program directors and support staff, etc.

Outreach and Marketing

The Air Force SBIR | STTR Program Management Office socializes and publicizes the results of these activities, the return on investment associated with Tech Warrior Enterprise participation -- to include Phase II+ investments, Phase III contracts, venture capital funding offers, sales, transition and commercialization. We leverage social media, press releases, video products for delivery to the appropriate audience -- stakeholders, supporting organizations, sponsoring and managing organizations, and small business communities.

Beginning in late 2017, the Wright State Research Institute Staff, with support from Air Force SBIR | STTR Program Management Office support staff, developed branding/logos, publications, social media channels, infographics, videos, a website, and display posters. The team also developed logos for Tech Warrior Enterprise, Tech Warrior OPS, Tech Warrior CONNECT, and Operation Tech Warrior. A folder and fact sheets for the Enterprise and each of its opportunities/types of events was printed and distributed and a Tech Warrior 101 slide presentation was developed. A Tech Warrior Enterprise overview article was delivered to 88th Airbase Wing Public Affairs at Wright-Patterson AFB, Ohio and was published in November 2017.

Additionally, the team created and maintained two Tech Warrior Enterprise social media channels:

- Facebook, <https://www.facebook.com/techwarriorenterprise>;
- Twitter, https://www.twitter.com/T_W_Enterprise.

As part of the Tech Warrior Enterprise, The Air Force SBIR | STTR Program Office and Wright State Research Institute participated in four SBIR | STTR and Tech Warrior Enterprise 101 events hosted at the 444 Small Business Hub, the National Center for Medical Readiness/Calamityville, Tec Edge/Wright Brothers' Institute, and The Doolittle Institute.



- The first event occurred in December 2017 at the 444 Small Business Hub in Dayton, Ohio, and was attended by approximately 50 people. The simultaneous webcast reached hundreds of viewers;
- The second event occurred in March 2018 at the National Center for Medical Readiness in Dayton, Ohio and was attended by approximately 50 people. The simultaneous webcast reached hundreds of viewers;
- The third event occurred 13 June 2018 during the Air Force SBIR | STTR Center Program Managers meeting at Tec Edge in Dayton, Ohio. Approximately 30 people attended;
- The fourth event occurred in July during a small business event at The Doolittle Institute in Niceville, Florida, in July 2018. The simultaneous webcast reached hundreds of viewers.

The Air Force SBIR | STTR Program Director and support staff also attended GDI Associates' TRIAD Ohio Technology Pitch event from August 13-16, 2018. The program director briefed on both SBIR and STTR 101, the Commercialization Readiness Program and Tech Warrior Enterprise. Fifteen companies attended and pitched at the event, and technologies were evaluated by a team from Air Force SBIR | STTR, Air Force T3, the Air Force Materiel Command Small Business Office, Central Command, The Department of Homeland Security, the Defense Technical Information Center, and Indo-Pacific Command.

Tech Warrior CONNECT



The first ever Tech Warrior CONNECT event, held March 1 and 2 involved Yotta Navigation Corporation (California), which had a Phase I SBIR contract at AFRL's 711th Human Performance Wing to provide personal navigation for battlefield airmen. Called the Mobile Activity Tracking System, the team from Yotta leveraged the NCMR facility to run test scenarios.

A second Tech Warrior CONNECT event followed closely on March 6 when Aptima (Massachusetts), which is developing a technology called BATTLE under a Phase I SBIR contract, with AFRL met with a representative from Air Force 123rd Pararescue Special Tactics group to gather feedback about the group's training activities.

A third Tech Warrior CONNECT event was held March 20 when Carver Scientific, Inc. (Louisiana) integrated its microclimate cooling/heating vest prototypes with 88th ABW Explosive Ordinance Disposal personnel training scenarios. The EOD team provided form, fit and function feedback to be used during further research and development on its Phase II SBIR project, which is sponsored by Air Force Life Cycle Management Center and managed by AFRL.

Fifteen additional Tech Warrior Events took place during the first 12 months.

Tech Warrior OPS



The first Tech Warrior OPS event was held April 9 to 13 and 17, 2018. The event integrated small business technologies with warfighter and first responder training to solicit feedback and data from operators, in this case personnel from Air Force security forces, explosive ordnance disposal, pararescue, and the Ohio State Highway Patrol's Special Response Team. Twelve small businesses participated in the event.

Event visitors included a technology scout, Brett Scharringhausen, from Central Command HQ, who identified technologies that matched current CENTCOM requirements.

The second Tech Warrior OPS event was held July 17 to 20, 2018. This event integrated small business technologies with forward/special operator participants, including personnel from the Air Force Sustainment Center's Aircraft Battle Damage Repair team, Air Force security forces, the 88th ABW EOD team, and Ohio Department of Corrections. The event also included a visit from Valerie Muck, Director of the Air Force Small Business Program, SAF/SB.

An additional, mini Tech Warrior OPS event took place during the first 12 months.



18 Tech Warrior CONNECT and 3 Tech Warrior OPS

events provided special operator and first responder communities with early demonstration of small business technologies.

Operation Tech Warrior



More than 30 companies from around the country tested innovations during the annual Operation Tech Warrior technology acceleration event held September 17 to 28, 2018. A wide range of technologies were integrated into training missions at Operation Tech Warrior. Many of the trainees were subject matter experts from the Air Force Research Laboratory, who would not normally get an opportunity to see how technology performs in combat. The cadre of instructors, comprised of warfighters with a myriad of combat deployment experience, also provided critical feedback to business participants.

For example, Rockledge, Florida-based Mainstream Engineering Corp. brought multiple technologies to Operation Tech Warrior, including an ATV for which the company makes an engine that can run on any fuel; a water processing system that allows sink water to be returned to drinking water quality; and an environmental control unit, also known as an ECU, used for cooling shelters in the field.

Integrating those products into Operation Tech Warrior provided a more direct line to applications at operating bases, so the company got to see its use and issues through that perspective.

For the ECU, Mainstream Engineering originally received an Air Force SBIR award to improve its efficiency. Feedback provided at Operation Tech Warrior – such as a request to replace one of the electric connectors with a different product – is expected to drive even more improvements.

Miamisburg, Ohio-based Cornerstone Research Group brought its aeromedical patient stabilization platform to Operation Tech Warrior. Also known as ATLIS, the platform is designed to provide a more secure method of transporting patients in flight while averting the pressure sores and other physical problems caused by the extended use of a traditional stretcher.

Developed with an Army SBIR contract and a Cooperative Research and Development Agreement through the Air Force Technology Transfer Program, Operation Tech Warrior allowed the company to test new strap configurations with multiple user groups as well as test loading onto different types of vehicles.

San Francisco-based HVMN brought its ketone ester drink. The drink – with ties to the SOCOM's STTR Program – is designed to improve warfighter performance both physically and cognitively.



"We wouldn't have gotten access to the vehicles as readily unless we were here. Being able to improve straps is a small nuance that will make a big improvement to the patient experience."

— Joshua Neiman,
Research Engineer
Cornerstone Research Group

...

"It was really useful to speak to the participants and find out what their operational needs are when they're out on this kind of exercise, but also to speak to other technology companies that are here to see how they've been working with the military to refine and then bring their technologies from concept to be applied."

— Brianna Stubbs
Head of Science
HVMN.

Baton Rouge, Louisiana-based Carver Scientific brought its microclimate cooling device, which fits under body armor and was developed with support from the Air Force SBIR | STTR Program. Attending Operation Tech Warrior allowed the device to be used in rainy conditions for the first time.

Ritchie Priddy, business development director for Carver Scientific, said the device's performance was hindered by participants wearing ponchos. However, now he is aware of the issue and has ideas about how to fix it.

Carver Scientific has participated in all three components of the Tech Warrior Enterprise. The result has been feedback from a wide array of stakeholders ranging from first responders and special operations personnel to senior-level leaders, scientists and engineers.

Results

During the first 12 months of the Tech Warrior Enterprise, the administrative team designed and executed 18 Tech Warrior CONNECT events with 14 small businesses, two Tech Warrior CONNECT events with multiple user communities, and a mini-Tech Warrior OPS with Ohio's Montgomery County SWAT Team, with nearly 30 small businesses participating, and the annual Operation Tech Warrior event alongside the Air Force Research Laboratory with 30+ small businesses participating.

To date, the return on initial investment in the pilot program, which was around \$2.4 million (two-year period of performance), is tracked at over \$30 million.



TECH WARRIOR ENTERPRISE Participants



Tech Warrior Enterprise Videos

Video overviews and small business testimonials are available at the following locations:

Tech Warrior CONNECT

- YouTube: <https://www.youtube.com/watch?v=nSgNXxoNi3Q&t=68s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/602455/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/602455/tech-warrior-connect>

Tech Warrior OPS

- YouTube: https://www.youtube.com/watch?v=Xs6sDK6Kp_A
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/629523/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/629523/tech-warrior-ops-overview>

Tech Warrior OPS; An interview with NCMR's John Matecki

Tech Warrior OPS events take place several times a year at the National Center for Medical Readiness/Calamityville site, a Wright State Research Institute facility. During these events, small businesses introduce, demonstrate, test and validate technologies alongside military special operators and first responders. NCMR Associate Director of Training and Exercises John Matecki explains.

- YouTube: <https://www.youtube.com/watch?v=N5TBbLT8xPw>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640938/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640938/tech-warrior-ops-participant-spotlight-john-matecki>

Tech Warrior OPS Participant Spotlight: AlphaMicron

Kent, Ohio's Alphamicon received an Air Force Small Business Innovation Research/Small Business Technology Transfer award to develop auto tinting cockpit visors. The resulting technology, called e-Tint is a liquid crystal film that has been adapted to a polycarbonate ballistic lens. With military operators and police in mind, Alphamicon integrated electronics into a frame that allows the lens to tint via manual push of a button or automatically. The eyewear is currently available commercially.

- YouTube: <https://www.youtube.com/watch?v=W0QkbQZsPs4>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640932/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640932/tech-warrior-ops-participant-spotlight-alphamicon>

Tech Warrior OPS Participant Spotlight: Aptima

Aptima is a human-centered engineering company that is working to improve performance of individuals and teams by developing sophisticated approaches for measuring human performance. Performing work under an Air Force Small Business Innovation Research/Small Business Technology Transfer Program award, Aptima is developing an augmented reality technology, which allows the introduction of constructed entities to a training environment using a Live Virtual Constructed Training approach. Aptima demonstrated this and a technology, called Spotlight, for military special operators and Ohio first responders.

- YouTube: <https://www.youtube.com/watch?v=5WzEnl9pZ5c&t=2s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640934/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640929/tech-warrior-ops-participant-spotlight-aptima>

Tech Warrior OPS Participant Spotlight: B5 Systems

B5 Systems, develops technologies for military and aerospace manufacturing customers, including firearms accessories and an in-line communication device that records communication coming in and transmitting out of a standard military field radio.

- YouTube: <https://www.youtube.com/watch?v=pDy90PXqd1E&t=5s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/639988/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/639988/tech-warrior-ops-participant-spotlight-b5-systems>

Tech Warrior OPS Participant Spotlight: Battle Sight Technologies

Battle Sight Technologies, a service-disabled veteran-owned small business, licensed a technology from the Air Force Research Laboratory to develop a marking technology for military special operators and first responders. The device is a pressure active chemoluminescent writing utensil that allows the user to write and mark walls in the infrared spectrum. The writing can be seen using night vision goggles in low-light and no-light environments, and leverages technology licensed from the Air Force Research Laboratory's Materials and Manufacturing Directorate. This video was taken in April of 2018.

- YouTube: <https://www.youtube.com/watch?v=HKsFAK7wkJ4&t=4s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640936/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640936/tech-warrior-ops-participant-spotlight-battle-sight-technologies>

Tech Warrior OPS Participant Spotlight: Battle Sight Technologies

Battle Sight Technologies, a service disabled veteran owned small business, licensed a technology from the Air Force Research Laboratory to develop a marking technology for military special operators and first responders. The device is a pressure active chemoluminescent writing utensil that allows the user to write and mark walls in the infrared spectrum. The writing can be seen using night vision goggles in low-light and no-light environments, and leverages technology licensed from the Air Force Research Laboratory's Materials and Manufacturing Directorate. This video was taken in July of 2018.

- YouTube: <https://www.youtube.com/watch?v=IBS5AsrNExM&t=3s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640662/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640662/tech-warrior-ops-participant-spotlight-battlesight>

Tech Warrior OPS Participant Spotlight: BloodStone Division LLC

Bloodstone Division LLC designs individual first aid kits for first responders, who are operating in a GPS-denied, high-risk environment, so they can quickly get to their gear and render life-saving care.

- YouTube: <https://www.youtube.com/watch?v=pueKw5PQUi8>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/639992/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/639992/tech-warrior-ops-participant-spotlight-bloodstone-division-llc>

Tech Warrior OPS Participant Spotlight: Carver Scientific

Louisiana-based Carver Scientific, participating in research under an Air Force Small Business Innovation Research/Small Business Technology Transfer Program Phase II award, is developing a micro-climate, heating and cooling product for military operators and first responders. The unit weighs less than a pound and is designed to enhance homeostasis for wearers in a variety of domains.

- YouTube: https://www.youtube.com/watch?v=3X4py_gBnZw
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640940/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640940/tech-warrior-ops-participant-spotlight-carver-scientific>

Tech Warrior OPS Participant Spotlight: Centeye, Inc.

Washington, DC's Centeye, Inc., is a developer of extremely compact vision systems for small drones. The image sensor, which weighs as little as a fraction of a gram, provides a drone with visual awareness of its environment.

- YouTube: <https://www.youtube.com/watch?v=OkseBJqgf2o>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/630559/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/630559/tech-warrior-centeye-inc>

Tech Warrior OPS Participant Spotlight: Conductive Composites

Conductive Composites, a Utah-based small business participating in the Air Force Small Business Innovation Research| Small Business Technology Transfer Program, is developing a variety of products and services with applicability to commercial and military markets.

- YouTube: <https://www.youtube.com/watch?v=DlhorSRvRbE&t=13s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/643858/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/643858/tech-warrior-ops-participant-spotlight-conductive-composites>

Tech Warrior OPS Participant Spotlight: Eccrine Systems

Cincinnati, Ohio's Eccrine Systems, conducting research under an Air Force Small Business Innovation Research/Small Business Technology Transfer award has developed a sweat sensor to improve the health, safety and wellness of those who are in danger of dehydration or heat stress. Based on feedback gathered at a variety of Tech Warrior Enterprise events, Eccrine has launched a full commercial roll out of its product.

- YouTube: <https://www.youtube.com/watch?v=17dPghDphCY&t=1s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640934/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640934/tech-warrior-ops-participant-spotlight-eccrine>

Tech Warrior OPS Participant Spotlight: Legionarius

Boston, Massachusetts-based Legionarius is creating garments that detect impacts to the user; gunshot wounds, stabbing wounds, other type of wounds that can happen out on the battlefield. The garment sends out a distress signal with the type of the wound, the wound location on the body, and some vital sign information to the combat medics on the team and the team members. It also starts to do a wound treatment process.

- YouTube: <https://www.youtube.com/watch?v=cQ1JsWDO8JA>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/641070/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/641070/tech-warrior-ops-participant-spotlight-legionarius>

Tech Warrior OPS Participant Spotlight: Mike Sutton Consulting, Inc.

Performing research under an Air Force Small Business Innovation Research/Small Business Technology Transfer Program award, MSCI developed a blended reality system that takes virtual 3D images and integrates them into a live scene through a set of stereoscopic goggles in order to create realistic training environments.

- YouTube: <https://www.youtube.com/watch?v=Zg66ynmks9Q&t=1s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640946/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640946/tech-warrior-ops-participant-spotlight-msci>

Tech Warrior OPS Participant Spotlight: Newcomer Arms, LLC

New Jersey-based small business Newcomer Arms, LLC, is developing a wrist dock, which is a wrist appendage that slides on and gives military operators a hands-free experience when they put their handheld electronics on the forearm. The company also have a ruck dock system, licensed from the Air Force Research Laboratory that provides a weight bearing advantage by distributing the load of a military operator's ruck sack.

- YouTube: <https://www.youtube.com/watch?v=2PwHjWaZwew&t=3s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/639991/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/639991/tech-warrior-ops-participant-spotlight-newcomer>

Tech Warrior OPS Participant Spotlight: Propel, LLC

Propel, LLC, has developed novel way to remove the stitching and seam taping requirements for wet weather garments under a Navy Small Business Innovation Research Program contract. The result is about a 30 percent weight savings and a 40 percent bulk savings, which means a military operator can pack it much tighter and it weights much less.

- YouTube: <https://www.youtube.com/watch?v=OZgiCJB3lyk&t=11s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/639986/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/639986/tech-warrior-ops-participant-spotlight-propel-llc>

Tech Warrior OPS Participant Spotlight: Puffin Innovations

Puffin Innovations, located in Woburn, Massachusetts, creates smart, assistive technologies. One of these technologies allows users to interact with advanced optical computers without moving their bodies or using their hands.

- YouTube: <https://www.youtube.com/watch?v=eVXY4lWFxvk&t=40s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/629466/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/629466/tech-warrior-ops-participant-spotlight-puffin-innovations>

Tech Warrior OPS Participant Spotlight: Salient Technologies, Inc.

Bozeman, Montana's Salient Technologies Inc. brought two technologies for demonstration and testing at the July 2018 Tech Warrior OPS event. First, the company demonstrated a pack raft its developed for single, individual use. Salient's raft can be deployed in the matter of seconds as opposed to several minutes. It also demonstrated a water purification system to address bacterial contaminated water.

- YouTube: <https://www.youtube.com/watch?v=R37ezKKFTW8&t=4s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/640020/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/640020/tech-warrior-ops-participant-spotlight-salient-technologies>

Tech Warrior OPS Participant Spotlight: Yotta Navigation Corp.

Yotta Navigation Corp., located in Santa Clara, California, is developing a compact, rugged, reliable and cost effective Mobile Activity Tracking System with support from the Air Force Research Laboratory's Small Business Innovation Research/Small Business Technology Transfer Program.

- YouTube: <https://www.youtube.com/watch?v=KvzdZ2bilEs>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/629482/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/629482/tech-warrior-ops-participant-spotlight-yotta-navigation-corporation>

Operation Tech Warrior 2018

- YouTube: <https://www.youtube.com/watch?v=gxnL2gG7pkg>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/646989/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/646989/operation-tech-warrior-2018-overview>

Operation Tech Warrior 2018 Participant: ARMOR Systems

Boston, Massachusetts small business ARMOR Systems demonstrated and tested their Tactical Arterial Compression System, which is designed to increase the survivability of traumatic battlefield injury in situations where immediate and advanced medical care is not available.

- YouTube: <https://www.youtube.com/watch?v=e4xzUc9oFB8>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/654043/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/654043/operation-tech-warrior-participant-spotlight-armr-systems>

Operation Tech Warrior 2018 Participant: Carver Scientific, Inc.

Louisiana-based Carver Scientific, participating in research under and Air Force Small Business Innovation Research/Small Business Technology Transfer Program Phase II award, are developing a micro-climate, heating and cooling product for military operators and first responders. The unit weights less than a pound and is designed to enhance homeostasis for wearers in a variety of domains.

- YouTube: <https://www.youtube.com/watch?v=M9subnVwVwk&t=16s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/647907/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/647907/operation-tech-warrior-participant-spotlight-carver-scientific>

Operation Tech Warrior 2018 Participant: Conductive Composites

Utah-based small business Conductive Composites demonstrated and tested its electromagnetic protection capability that its injection molded cases.

- YouTube: <https://www.youtube.com/watch?v=iAaJuy4dXDM>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/654041/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/654041/operation-tech-warrior-participant-spotlight-conductive-composites>

Operation Tech Warrior 2018 Participant: Cornerstone Research Group

Ohio-based small business Cornerstone Research Group demonstrated and tested a variety of technologies, including its aeromedical evacuation stretcher.

- YouTube: <https://www.youtube.com/watch?v=GxQBeyxKml0>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/654036/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/654036/operation-tech-warrior-participant-spotlight-cornerstone-research-group>

Operation Tech Warrior 2018 Participant: HVMN, Inc.

HVMN, Inc., a small business that is working with an educational partner on a keytone ester drink to enhance warfighter performance, demonstrated its technology.

- YouTube: <https://www.youtube.com/watch?v=tBa4RbBCnJY>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/647833/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/647833/operation-tech-warrior-participant-spotlight-hvmn>

Operation Tech Warrior 2018 Participant: Hyprum, LLC

Ohio-based small business Hyprum, LLC, demonstrated and tested its Tactical Mobility System, which combines the features of a plate carrier with a personnel transport.

- YouTube: <https://www.youtube.com/watch?v=Yraw1tdmYT8>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/647901/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/647901/operation-tech-warrior-participant-spotlight-hyprum>

Operation Tech Warrior 2018 Participant: Kay Kare, LLC

Kay Kare designs and manufactures orthosis or braces to immobilize arms and different parts of the upper and lower limb.

- YouTube: <https://www.youtube.com/watch?v=J25lVldMlow&t=1s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/647786/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/647786/operation-tech-warrior-participant-spotlight-kay-kare-llc>

Operation Tech Warrior 2018 Participant: Mainstream Engineering

Florida-based small business Mainstream Engineering, demonstrated and tested a variety of technologies, including those used in waste water treatment at deployed bases and their environmental control units.

- YouTube: <https://www.youtube.com/watch?v=1l6L06b3aOM>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/654039/dvpplaylist/6037a08a350c0913986b0f8d2a4e3df3/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/654039/operation-tech-warrior-participant-spotlight-mainstream-engineering>

AFRL Small Business Hub

Collider events drive opportunity, discovery and identify supporting resources. Attendees are able to engage with fellow community members from business, government and academic circles. Focused around technology, entrepreneurship, and business growth, the Collider Series offers networking components in four different areas. These include:

- **Information Series** – educational or learning sessions
- **Partnership Series** – networking, partnership opportunities, matchmaking, Q&A panels, and problem solving
- **Innovative Technology Series** – targets specific leading-edge research areas and technology needs
- **Regional Ecosystem Series** – cross-promotes events happening throughout the region

To date, the Collider Project has 1,229 members, and has hosted 247 events. Join the Collider Project at www.meetup.com/collider.

For more information, connect with

Jim Masonbrink, AFRL/SB Hub Director - Wright Brothers Institute
james.masonbrink@wbi-innovates.com | 937-689-0889

The Small Business Hub is also active on Twitter (@AFRLBizHub).



The Air Force Research Laboratory's Small Business Hub was created to link entrepreneurs, businesses, industry and government organizations in support of tech-driven business growth, strengthening the Air Force industrial base and commercializing technologies for new market opportunities. Established in 2014 as a dual effort by the Wright Brothers Institute (WBI) and AFRL, the Small Business Hub regularly hosts free and open business events, which are also available via webinar technology, known as the Collider Project.



Marketing ^{AND} Communications

In FY 2018, the Air Force SBIR | STTR Program Management Office continued to increase our strategic marketing activities and media relations, building upon the strategic marketing play approved in FY 2017. Each target audience has unique characteristics that impact the type and frequency of communications to that group. Key messages were delivered to these audiences through a variety of media channels passed on the preferred methods of receiving communications.



SMALL BUSINESS Outreach Events

The Air Force SBIR | STTR Program Office participated in a variety of additional outreach and training efforts, including:

Dayton Defense Member/Community Showcase 17 January | Dayton, OH

Members of the defense community in Dayton showcased their booths and talked with small businesses about how to develop relationships with government agencies and larger businesses within the area.

UDRI-SBIR|STTR Proposal Writing Workshop 21 February | Dayton, OH

This event provided an opportunity for small businesses to learn more about writing proposals for Phase I and beyond awards for SBIR | STTR programs.

Small Business Matchmaker at Wright State University 1-2 May | Dayton, OH

This event provided an opportunity for small businesses to learn more about contracting with the government, and participate in one-on-one meetings with government procurement officials and prime contractors.

Wright Dialogue with Industry 17-19 July | Dayton, OH

This events targets companies that are creating, manufacturing, or delivering technology-related products, engineering services, or professional services. Companies gain market intelligence about there they could expand through emerging Air Force opportunities to connect to science and manufacturing and speak one-on-one with Air Force and industry leaders.

TRIAD Ohio 13-16 August | Columbus, OH

TRIAD (Technology Requirements & Innovation Awareness Days) Ohio and subsequent TRIAD events create a space where companies with DoD requirement responsive technology can actively engage with the eyes and ears of the U.S. Combatant Commands, the science & technology scouts. Companies that participate in TRIAD events will have the chance to present their tech to the scouts in closed pitch sessions and showcase events.

Briefing for Industry 13-16 August | Albuquerque, NM

The Briefing for Industry brought together AFRL, Space and Missile Systems Center and government organizations in New Mexico for a review of new business opportunities.

Beyond Phase II 14-16 August | Orlando, FL

This collaborative event will impart unique insights and opportunities to help small businesses advance their ability to innovate and transition solutions to meet existing and emerging DoD capability needs via the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.



SBIR | STTR Hotline

In FY 2018, 800-line functionality was relinquished with the elimination of Pilot Administration Funding, but the information email continued to provide support to small businesses. Inquiries covered components of the program such as status requests on submitted proposals and debriefs, broad agency announcement and program awareness, website and technical support, and questions regarding contractual matters.

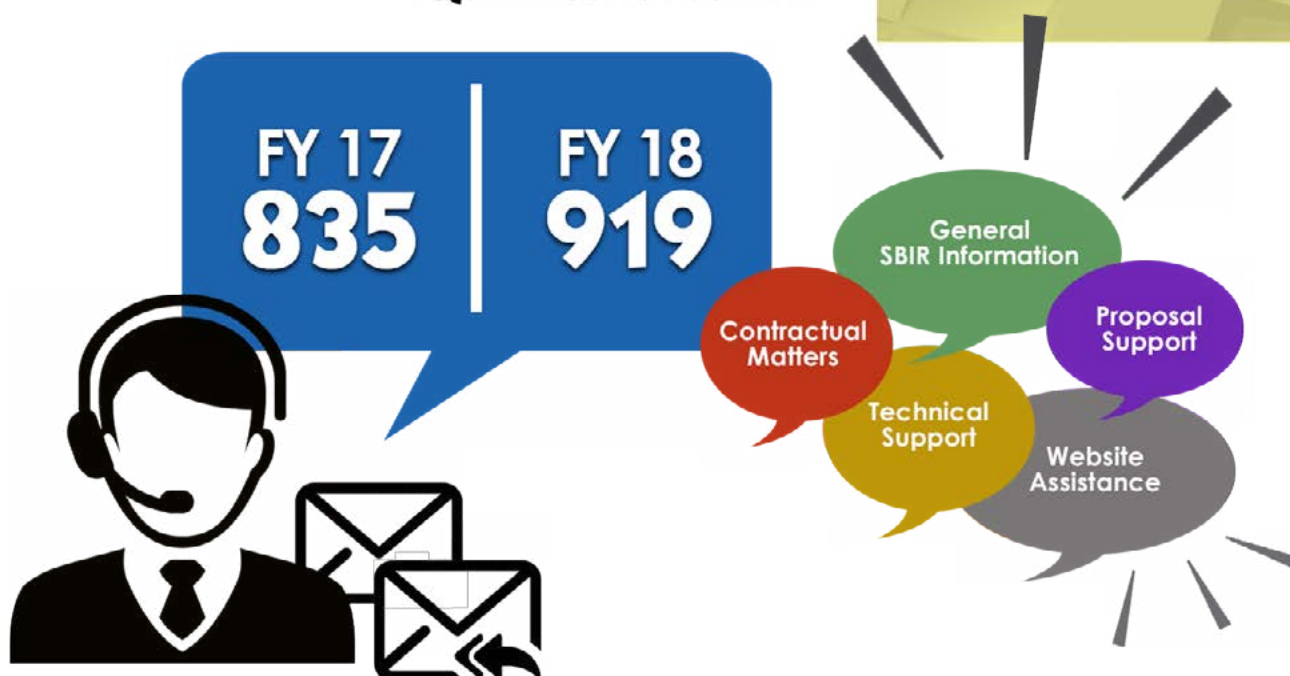
In FY 2018, 314 inquiries were in regards to general SBIR information and proposal support, 199 requested support on proposal notifications and status of debriefs, 158 were requests for website and technical assistance, and 44 were related to contractual matters. 204 miscellaneous emails requesting support not directly related to Air Force SBIR | STTR were also received.

In order to mitigate the more complex or technical questions, program support conducted extensive research, internal datamining, SBIR | STTR documentation referencing (instruction, policies, etc.), and Point of Contact coordination in order to provide optimal support.



In 2015, the Air Force SBIR|STTR Program Management Office added dedicated staff to support the small business program information e-mail account (afsbirsttr-info@us.af.mil) and a small business information line (1-800-222-0336). This program support staff was responsible for providing feedback and responses to queries received.

SBIR | STTR Total Information Queiries Received



OUR Social Media

The tenants of this work include:

- Delivering compelling and relevant content to increase transparency and visibility about the program;
- Sharing and responding to SBIR | STTR related developments and policy or program changes;
- Promoting outreach activities, events, and other opportunities;
- Delivering an improved understanding of the program;
- Soliciting feedback from current and potential program participants; and
- Increasing advocacy for the SBIR | STTR program from key stakeholders.

The following charts demonstrate our growth on the Facebook, LinkedIn and Twitter social media platforms during the 2018 fiscal year.

During the 2018 fiscal year, the program office also ran a series of brand awareness and engagement ads via the Facebook social media platform. We reached a customized small business demographic of over 100,000 individuals with details about the DoD SBIR | STTR Broad agency announcements.

Facebook: <http://www.facebook.com/afsbirsttr>

Twitter: http://www.twitter.com/af_sbir_sttr

LinkedIn: <http://www.linkedin.com/company/afsbirsttr>



In the interest of reaching a broad audience, including Air Force SBIR|STTR stakeholders, small business communities and partners, the program office has been active in several social media platforms.



Growth....

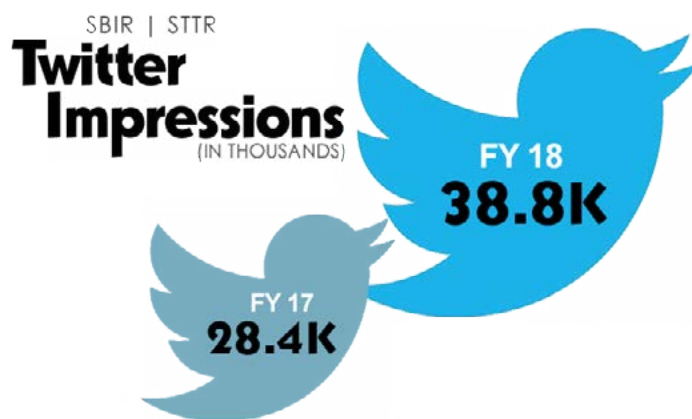
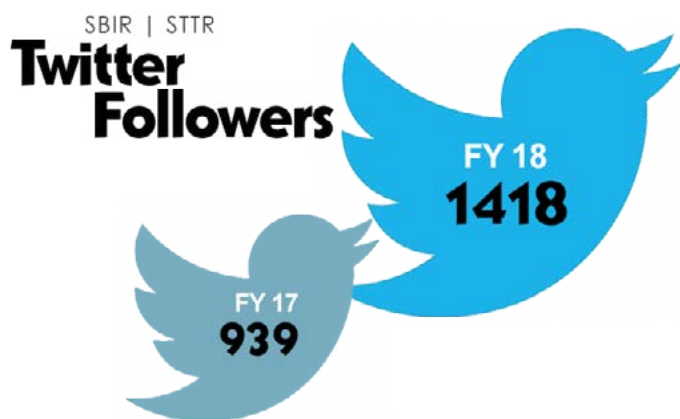
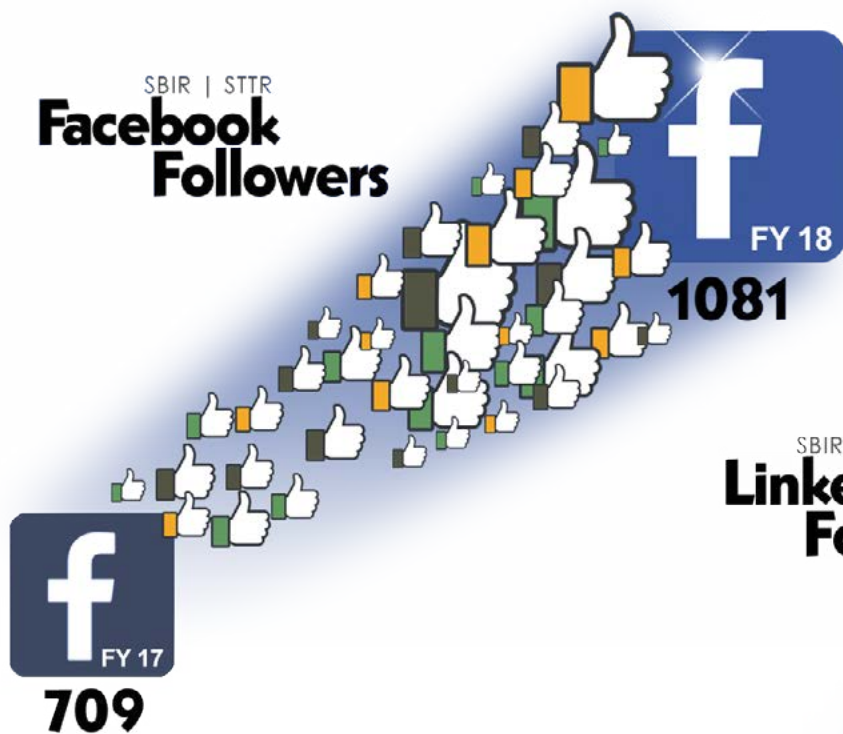
Facebook - 52%

Twitter - 51%

Linkedin - 505%

Twitter impressions - 37%

**Social media advertisements reaching
100K+ individuals**



FY 2018 Videos

During FY 2018 the channel grew to 159 subscribers (nearly double the previous year), and a large margin of traffic came from individuals who were not regular subscribers. During that period, videos on the channel were viewed over 17,550 times (at an averages of two minutes per view) and the videos were shared 279 times.

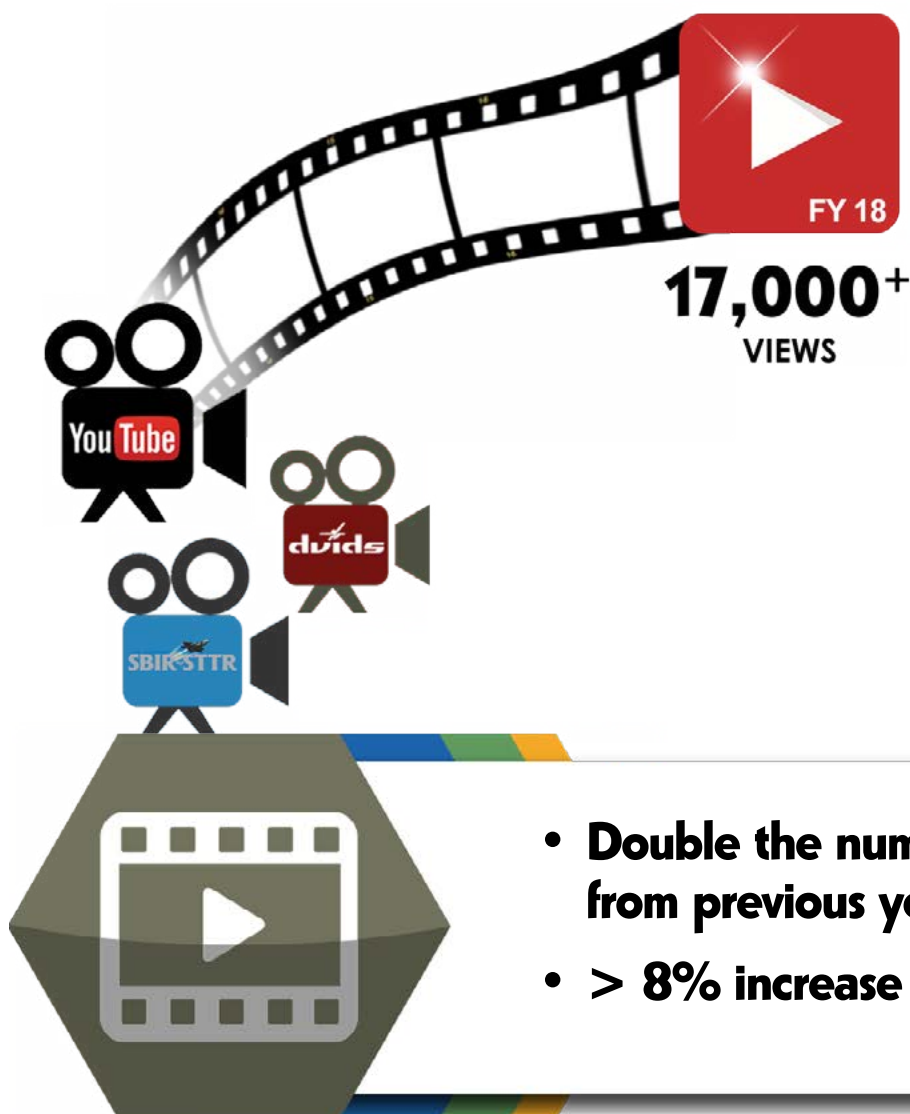
The following are videos that were posted during that period.

The videos are available on YouTube and DVIDs (search Air Force SBIR | STTR).



In December 2015, the Air Force SBIR|STTR Program launched a YouTube channel. The channel provides videos dealing with a broad array of successes and program information. To assist in this endeavor, the program office added a full time videographer/producer to staff in July 2016.

Videos are also posted to Defense Video and Imagery System (DVIDs) and to the Air Force SBIR|STTR website (<https://www.afsbirsttr.af.mil>).



PROGRAM INFORMATION:

A Bridge to the Future: The Air Force SBIR|STTR Program

The Air Force Small Business Innovation Research program is the bridge to the future for Air Force technologies.

- YouTube: <https://studio.youtube.com/video/R2U8xPSonWM/edit>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/629524/dvpplaylist/2c2db133fa7caf940e64a84d68ffbc46/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/629524/bridge-future-air-force-sbir-sttr-program>

Special Topics for Special Businesses: Air Force SBIR Offers Six Special Topics

The Air Force and Air Force SBIR|STTR Program Office are experimenting with new ways to accelerate the development of cutting edge technology. In the first of many innovative ideas, the SBIR office is putting out six special topics for small businesses to bid on during the Department of Defense's 18.2 SBIR Broad Agency Announcement opening May 22, 2018.

- YouTube: https://www.youtube.com/watch?v=qems_0UPSoU
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/595000/dvpplaylist/2c2db133fa7caf940e64a84d68ffbc46/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/595000/special-topics-special-businesses-air-force-sbir-offers-six-special-topics>

Air Force Pitch Day - March 6 & 7, 2019

The Air Force Pitch Day will take place in New York City on March 6 and 7, 2019. On day one, officials from three of the Air Force Program offices will be hearing pitches from small businesses and startups. After hearing the pitches, companies will be selected for awards and provided a contract on the spot.

- YouTube: https://www.youtube.com/watch?v=qems_0UPSoU
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/595000/dvpplaylist/2c2db133fa7caf940e64a84d68ffbc46/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/595000/special-topics-special-businesses-air-force-sbir-offers-six-special-topics>

SEEDING THE FUTURE:

Seeding the Future videos demonstrate the positive effect Air Force SBIR|STTR funding has on small business; from company growth to commercial sales or other economic impact.

Seeding The Future: Total Quality Systems | Roy, Utah

Working under an Air Force SBIR|STTR Program effort, Total Quality Systems developed a technology to close the gap in the testability of line replaceable units (LRU), which provide key aircraft functions. The automatic test equipment evaluates certain functions of the LRU, including connections, broken wires, fractured solder joints, etc., within the aircraft chassis. Within this LRU itself there are 8,400 circuits that have to be checked, which proved almost impossible to do manually.

IFDIS, the Intermittent Fault Detection Isolation System, solves a very important and key part of the supply chain, keeping weapon systems up in the air. As a result of developing this technology, Total Quality Systems was received several Phase III contracts and the Small Business Administration's Tibbetts Award.

- YouTube: <https://www.youtube.com/watch?v=SbQnaBSlpts&t=34s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/581569/dvpplaylist/50c84ca776626f3caf7817b376444f03/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/581569/seeding-future-total-quality-systems>

Seeding The Future: Dynamic Structures and Materials, Inc. | Franklin, Tennessee

Through participation in the Air Force SBIR|STTR Program, Dynamic Structures & Materials, Inc. has developed a reliable cryogenic flow device that controls the flow of various gasses or fluids that it is both valve and a motor combined. It is inherently simple, and the simplicity means that it has low cost, and it also means that it has a low failure rate.

DSM manufactures both the valve portion and the actuator portion in house, so they are going to do a low production run for the Air Force, and will be manufacturing those from scratch.

- YouTube: <https://www.youtube.com/watch?v=3754HBw-26k&t=40s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/578647/dvpplaylist/50c84ca776626f3caf7817b376444f03/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/578647/seeding-future-dynamic-structures-and-materials-inc>

Seeding The Future: Optical Sciences Corp. | Huntsville, Alabama

Optical Sciences Corp., a small business based in Huntsville, Alabama, specialize in hardware-in-the-loop simulations, and the testing of infrared sensors. Their infrared scene projector technology enhances the Air Force mission by improving its ability to test sensors in at ground test facilities.

With funding from the Air Force SBIR|STTR program, Optical Sciences developed a digital micro mirror device and applied it to the testing of infrared missile seekers. Additionally, the company figured out how to use this technology in a space simulation chamber at Arnold Engineering Development Complex, where the device operates in temperatures below 100 kelvin, and within a vacuum environment.

- YouTube: <https://www.youtube.com/watch?v=yXWOnAn-YcA&t=178s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/578645/dvpplaylist/50c84ca776626f3caf7817b376444f03/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/578645/seeding-future-optical-sciences-corporation>

Seeding The Future: CFD Research Corp. | Huntsville, Alabama

Participating in the Air Force SBIR|STTR Program has been a key part of CFD Research Corp.'s growth. Its gone from a small two or three-person company in a basement, to about 105 employees and about a \$20 million-dollar company largely through participation in Air Force SBIR|STTR and other DoD SBIR programs.

- YouTube: <https://www.youtube.com/watch?v=Gir6iBqEM2o&t=2s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/573038/dvpplaylist/50c84ca776626f3caf7817b376444f03/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/573038/seeding-future-cfd-research-corporation>

SUCCESS STORIES:

Success Story videos focus on how the technology, product or service developed under the Air Force SBIR|STTR Program meets the needs of the warfighter and demonstrates how the small business delivers a return on the Air Force SBIR|STTR investment.

Daily Grind; Development in Belt Grinding Improves Weapon System Readiness **ES3 | San Diego, California**

The Air Force SBIR|STTR Program and ES3 have provided a belt grinding technology that results in a safer way to grind landing gear technology. Belt grinding helps the warfighter by increasing throughput during the grinding of chrome and high velocity oxygen fuel and base materials. The process is safer, less costly and increases readiness by putting the warfighter back in their aircraft weapon systems.

- YouTube: https://www.youtube.com/watch?v=4_uAkFvhESA
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/596843/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/596843/daily-grind-development-belt-grinding-improves-weapon-system-readiness>

Did I Sputter? Technology Offers Repair for Landing Gear, Cost Savings **ES3 | San Diego, California**

The most critical subsystem of aircraft is the landing gear. It has to support extreme loads and there's no other redundant pathways to support it. If the landing gear fails, it could be the difference between life or death.

With an investment from the Air Force SBIR|STTR Program, ES3 developed magnetron sputtering, a new technology that can repair landing gear cylinders, making them almost brand new, and keeping them flying instead of throwing them away. Using magnetron sputtering will save the Air Force almost \$2 to \$3 million a year.

- YouTube: <https://www.youtube.com/watch?v=oAilOcySED0&t=137s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/598686/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/598686/did-sputter-technology-offers-repair-landing-gear-cost-savings>

Fighting the Good Fight; 2,000 Components Flying with Environmentally Friendly Coating **ES3 | San Diego, California**

With support from the Air Force SBIR|STTR Program, ES3 developed a Zinc Nickel replacement for Cadmium, which has been used on aircraft landing gear to fight corrosion. Cadmium is also carcinogenic.

As a result of this work there are currently 2,000 landing gear components flying with Zinc Nickel on them. ES3 has also plated components for Boeing and now Boeing, UTCAS, Bell Helicopters and other companies currently have their own zinc nickel plating lines using this technology.

- YouTube: <https://www.youtube.com/watch?v=Div1L3WGAIU&t=11s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/596842/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/596842/fighting-good-fight-2000-components-flying-with-environmentally-friendly-coating>

Fastening Radomes for Protecting Radar Systems Infinite Technologies | Folsom, California

Infinite Technologies Inc., working with the Air Force SBIR|STTR Program, developed fastening systems for radomes, an environmental cover that goes over a radar system or communication system to protect it from the environment and allows the system to maintain transmissions through it. The impacts on the technologies are broad; they reduce the initial time of installation time and eliminates time associated with maintenance schedules, stretching them out significantly and resulting in cost avoidance. The technologies are also durable. Combined these qualities reduce maintenance down-time significantly.

- YouTube: <https://www.youtube.com/watch?v=3FOP-8YBPqs&t=26s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/videoId/581574/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/581574/fastening-radomes-protecting-radar-systems>

Identifying Faults in Critical Aircraft Systems Total Quality Systems | Roy, Utah

The worst situation for a pilot to be in, is while he's in the weapon system to have some issue with the avionics that causes the radar to lose lock, the heads-up display to blank out, the on-board oxygen generating system cannot function properly, to where he either has to abort the mission or back off from the flight profile to get those systems to come back to life.

Under an Air Force SBIR|STTR Program effort, Total Quality Systems developed the Intermittent Fault Detection Isolation System, which tests functionally of aircraft systems. Universal Synaptics, TQS's small business partner in Roy, Utah, provides the IFDIS capability to fill testing gaps, returning aircraft to service, and extending their time on wing. The system is estimated to have saved the government millions of dollars.

- YouTube: <https://www.youtube.com/watch?v=0PUiSPL8vBI&t=106s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/videoId/652169/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/652169/identifying-faults-critical-aircraft-systems>

How Scintillating; Mass Tests Nuclear Scintillation Effects on Military Satellites Welkin Sciences | Colorado Springs, Colorado

With support from the Air Force SBIR|STTR Program, Colorado-based Welkin Sciences developed a MILSATCOM Atmospheric Scintillation Simulator, called MASS, which enables testing of nuclear scintillation effects on military satellite communication systems. The Air Force uses this device to ensure U.S. satellite communications remain effective should a high-altitude nuclear device be detonated.

Welkin Sciences has earned \$11.5M in revenue stemming from MASS and Digital IF – both of which originated as SBIR projects.

- YouTube: <https://www.youtube.com/watch?v=VjXMg0MtdHU&t=7s>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/videoId/603552/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/603552/scintillating-mass-tests-nuclear-scintillation-effects-military-satellites>

Hawk and eHawk; Giving Small CubeSats A Lot of Power **MMA Design LLC | Loveland, Colorado**

MMA Design, LLC, has leveraged funding from the Air Force Small Business Innovation Research | Small Business Technology Transfer Program to develop High Watts per Kilogram Hawk and the eHawk. The technology provides small CubeSats with a lot of power without taking up a lot of the bus. The Hawk array has been sold and used by the Air Force and was launched on a commercial resupply mission for the International Space Station.

- YouTube: <https://studio.youtube.com/video/bpyG65biPzM/edit>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/638433/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/638433/hawk-and-ehawk-giving-small-cubesats-lot-power>

What Goes Up Must Come Down; dragNET Removes Debris from Space **MMA Design LLC | Loveland, Colorado**

The dragNET technology, developed by MMA Design, LLC, with support from the Air Force SBIR | STTR Program is a hardware solution that is launched with a spacecraft. At the end of a spacecraft's life, it is deployed from its original form factor, the size of a shoebox, and grows up to a 14-square meter area.

The functionality of dragNET is to deorbit the spacecraft, in other words bring it back down to Earth in a faster time period than it normally would through the natural deceleration on orbit. Normally that process could take 25 years or more, with dragNET, it is reduced to less than two years. The technology makes space flight easier, and safer for both Air Force missions and manned space flight.

- YouTube: https://studio.youtube.com/video/tNWec0_vGTw/edit
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/638434/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/638434/goes-up-must-come-down-dragnet-removes-debris-space>

Size Does Matter; First RF Reduces the Size, Improves Performance of Antennas **First RF Corporation | Boulder, Colorado**

For a soldier on the ground, or an aircraft in the air, to add more and more capability often requires more power, weight, and cost. Colorado's First RF, supported by the Air Force SBIR | STTR Program, developed ultra-wide-band antenna technology, which allows one system to do many functions. It is smaller, offers expanded bandwidth and enhances the benefits to the warfighter.

- YouTube: <https://studio.youtube.com/video/wP9gxMgsi94/edit>
- AFSBIR Web Site: <https://www.afsbirsttr.af.mil/Media/Videos/video/639886/dvpplaylist/79f06d90c96d9b873eef490bb892cc75/dvpcc/false/#DVIDSVideoPlayer13316>
- DVIDS: <https://www.dvidshub.net/video/639886/size-does-matter-first-rf-reduces-size-improves-performance-antennas>

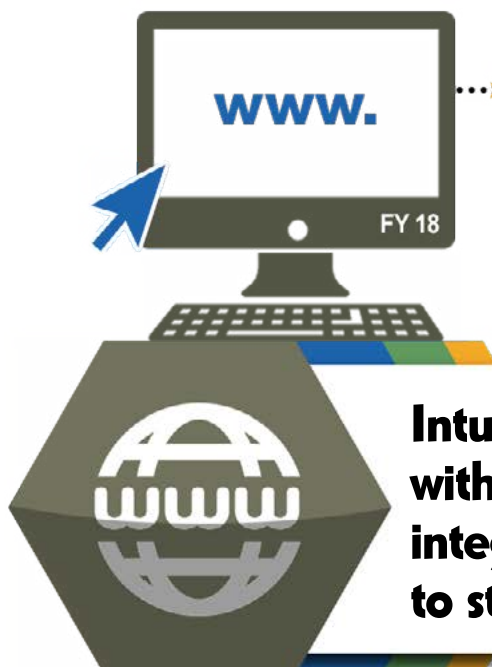
PROGRAM Website

The website offers a modern look and feel, as well as updated functionality compared to the legacy product that served the community for many years. Users can expect organized and complete information about the program, as well as improved access to supporting resources.

Key features of the website include:

- Compliance with AFI 35-107 and other DoD and Air Force regulations cited by the Air Force instruction;
- A page devoted to commercialization, which should be the goal of every company that participates in the program;
- Videos, success stories and news articles that highlight the accomplishments of small businesses, including direct links to presentation slides;
- Social media integration, including collection and display of all social media posts;
- Integration with the Defense Visual Information Distribution Service, DVIDS;
- An events calendar; and
- Mobile friendly and multi-browser compatibility.

Visit the website at <https://www.afsbirsttr.af.mil>



33,000⁺
unique IP addresses

**Intuitive, mobile-friendly platform
with DVIDs and social media
integration and direct downloads
to stakeholder resources**



Small businesses and other Air Force SBIR|STTR stakeholders can now access the program website, which was relaunched as a new and improved platform in September 2017.

FY 2018 Success Stories

Success by companies participating in the Air Force SBIR | STTR Program can be measured in a variety of ways. As topics move through the life cycle - of research development, evaluation, testing, and transition and commercialization - each advancement has value that should be celebrated.

Although the total program is vast, these success stories are examples of some of the best of the best.

- **685 projects transitioned since FY 2015
(5x increase in 8 years)**
- **Projects achieving success 58% faster than in FY 2010**



AIRCRAFT TESTING INNOVATION FUELS BIG SAVINGS AND INCREASED READINESS

DragoonITCN | Dayton, OH

FIELD Success Story

The Air Force is poised to save millions of dollars and return a key aircraft to service faster because of a testing technology improved through a small business partnership.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Ohio-based DragoonITCN created the Bus Characterization Integrity Toolset as a quicker and more precise way to diagnose certain aircraft system problems. Also known as BCIT, the test tool combines multiple capabilities into one; tests cabling more accurately by locating an open, short or ground to within six inches of the problem; and is portable enough for a single mechanic to carry into the bowels of an aircraft.

DragoonITCN sold earlier versions of the technology to the Air Force and Navy. More recent advancements – such as enhanced functionality with portability – have earned the company more than \$2 million in new Phase III contracts from the Air Force Research Laboratory's Information Directorate to develop and field new BCIT units and update older units. Phase III contracts, which denote funding from outside the Air Force SBIR | STTR Program, indicate that program participants are meeting a critical commercialization benchmark.

BCIT is expected to save the Air Force more than \$10 million during an ongoing B-1 modification cycle while more efficient trouble shooting and reduced repair times will boost future aircraft availability, according to Air Force projections.

BEHIND THE TECHNOLOGY

DragoonITCN launched BCIT about 15 years ago under the Air Force SBIR | STTR Program to develop a maintainer-friendly diagnostic network tester, analyzer and controller to collect multiple data streams from diverse sources. The tool would also need to be adaptable to the most popular data transfer standards beyond the legacy MIL-STD-1553 bus.

The “bus” is a series of connectors and cables that transfer information among the different avionics systems throughout an aircraft.

Early fundamental research focused on defining Ethernet requirements and a conceptual approach for an Ethernet monitor module as well as meeting environmental requirements for deployment on various platforms such as the B-1 and B-2 bombers, according to Joel Moore, a computer scientist in the High-Performance Systems Branch of AFRL's Information Directorate.

Initial funding provided the company with key engineering and manufacturing resources and spawned advancements such as alternate bus interfaces and digital video interface capabilities. Additional funding from the Air Force SBIR | STTR Commercialization Readiness Program last year enabled improvements on those

attributes while reducing BCIT's size, weight and power needs.

The prototype was about the size of a mini refrigerator, so shrinking it was a key development.

“We wanted the tester to be the maintenance technician's ‘go-to’ tester,” Moore said.

With support and guidance from AFRL along the way, including from AFRL's Aerospace Systems Directorate and Sensors Directorate, DragoonITCN matured the technology through multiple contracts and met the demand for a single bus interface and cable integrity tool that is portable, rugged and reliable.

COMMERCIALIZATION FUELS GROWTH

Because of its utility, BCIT is gaining acceptance as a bus testing tool across the Air Force fighter-bomber maintenance community and is often referred to as a “Swiss Army knife” test tool for legacy aircraft. This type of commercialization is critical because it ultimately helps drive down technology costs, bring new technology to the warfighter and stimulate the economy through small business growth.

Delivering a product rugged enough to withstand long-term use and that met the one-man-carry size and weight goals outlined by the B-1B Program Office has been key to growth at DragoonITCN and positioned the company for long-term success. The BCIT technology is the core of the company's new flagship product, Corvus.

Corvus is designed to be a key enabler for a wide range of new test targets including commercial avionics, missile ground-system enclaves, counter measure testers, and virtually any system architecture that is comprised of interfaces and cabling.



Employees of DragoonITCN prepare newer BCIT machines for use in the field. The Ohio-based company has been growing because of its work on the technology.

NEW WARGAME ANALYSIS TOOL WILL BOOST LONG-TERM MISSION SUCCESS

Frontier Technology Inc. | Beavercreek, OH

TRANSITION Success Story

The Air Force is poised to improve warfighter success rates in long-term conflicts with new wargaming technology developed by a small business partner.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Ohio-based Frontier Technology Inc. produced a modeling and simulation capability to allow military operations planners to more realistically assess potential maintenance and logistics situations in combat. Also known as ISWAT – for Integrated Sustainment Wargaming Analysis Toolkit – this analytical model addresses the overall impact of sustainment systems on the Air Force's ability to conduct protracted operations.

Frontier Technology matured ISWAT with additional support from the Air Force SBIR|STTR Commercialization Readiness Program and the Air Force Rapid Innovation Fund so it could be used by Air Force Materiel Command.

"We are using it in a lot of high-visibility wargames," said Dave Farrell, an acquisition program manager at Air Force Materiel Command. "And, not only are we receiving greater acceptance in the wargame community, the tool is starting to pick up steam in the logistics analysis community. We are finding new opportunities to integrate it with other M&S tools, wargaming events and analysis efforts. It really is making a difference."

The Air Force and other services routinely conduct wargames to test the ability of their people and processes to handle conflict. Without risking lives and aircraft, these exercises allow planners to find and correct deficiencies.

Prior to ISWAT, sustainment modeling and simulation during wargames typically consisted of senior military leaders relying on spreadsheets and professional judgment. This new technology will improve accuracy, and as a result improve success rates in the field.

BEHIND THE TECHNOLOGY

There has been a lack of significant research and development investment in wargaming technology in recent years. As a result, the growing "reality gap" has fostered an unrealistic expectation for weapons systems in modern combat simulations.

ISWAT has received significant interest within logistics and wargaming communities by addressing that critical shortfall.

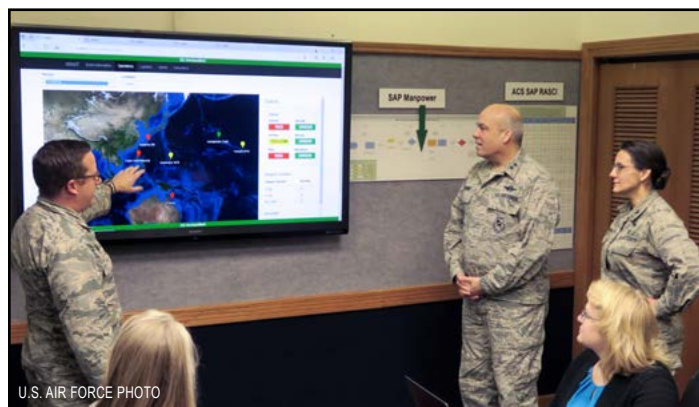
The Air Force SBIR|STTR project enabled Frontier Technology to perform detailed modeling of sustainment support for weapons systems. This included the frequency and duration of tasks and resources, as well as their impact on metrics such as sortie generation rate, availability, and mission capable rate.

For example, the new ISWAT technology can track and calculate engine time on a wing as a function of flown sorties. This allows for the possibility that the aircraft might not be able to fly the next mission because of maintenance needs. Previously, aircraft were only removed from simulations if destroyed in combat.

COMMERCIALIZATION IMPACT

Because of its success, the company has logged millions of dollars in Phase III contracts to support the Air Force, according to Todd Henrich, vice president, strategic product planning at Frontier Technology. The company has also been exposed to potential new customers from other services as well as partner nations that conduct wargames.

Phase III contracts – funding from sources outside of the Air Force SBIR|STTR Program – are a sign of commercialization success. This type of commercialization is critical because it ultimately helps drive down technology costs, bring new technology to the warfighter and stimulate the economy through small business growth.



(From left to right) Major Nick Kirsch, Maj. Gen. Michael Brewer and Col. Francesca Bartholomew of Air Force Materiel Command review the analysis from an ISWAT scenario. The new ISWAT technology, developed by an Ohio company with support from the Air Force SBIR|STTR Program technology, provides a more realistic impact of logistics in long-term conflicts.

MATERIALS DEVELOPMENT PROVIDES AIR FORCE WITH CRITICAL TEST ASSETS FOR ADVANCING HYPERSONIC VEHICLES

Materials Research & Design Inc. | Wayne, PA

TRANSITION **Success Story**

A small business partner has delivered a critical new tool to assist the Air Force in its race for hypersonic capabilities.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Pennsylvania-based Materials Research & Design Inc. created a material that can survive the extreme pressures and temperatures of a Mach 18 wind tunnel, a solution previously thought to be well out of reach.

As adversaries push for the technology, developing hypersonic capabilities is deemed the 'highest technical priority' by Michael Griffin, the Pentagon's Undersecretary of Defense for Research and Engineering.

The revolutionary capability Materials Research & Design provided through its material development will prove crucial for many years to come as the Air Force moves from developmental experimentation to rapid prototyping to full scale programs of record, according to Mallory Knight, Director of Engineering and Technical Management for the Air Force Test Center.

Originally managed by another federal agency, the Materials Research & Design project received approximately \$1.5 million in support from the Air Force SBIR|STTR Commercialization Readiness Program. So far, the company has earned more than \$1.1 million in Phase III contracts – funding from outside the Air Force SBIR|STTR Program. Because of its success on this project, Materials Research & Design expects sales to increase \$5 million during the next three years and will need to boost its engineering staff by at least 20 percent.

BEHIND THE TECHNOLOGY

Flow quality from a nozzle that maintains dimensions when exposed to the extreme pressures and temperature of the Mach 18 tunnel will allow precise measurements of aerodynamic forces and moments. In turn, that will accelerate the development of hypersonic vehicles by providing the highest Mach number to date.

Until this project was completed, a Mach 18 nozzle did not exist and nozzle throats supporting Mach 14 testing had to be changed every 50 to 100 tests.

Materials Research & Design, which specializes in the design and analysis of materials for extreme environments, worked with scientists and engineers at the Arnold Engineering Development Complex to find a solution to the problem.

The work involved simultaneously creating high-strength nozzle materials coupled with detailed thermal and structural design models supported by a measured material property database.

As a result, nozzle throats that are shape-stable for Mach 14 and Mach 18 testing have been delivered to the Arnold Engineering Development Complex Tunnel 9 facility in White Oak. This accomplishment will forever change how high-temperature nozzles are manufactured to support test operations at this hypervelocity wind tunnel.

Primary subcontractors on the effort included Amherst, New Hampshire-based Exothermics Inc.; Huntsville, Alabama-based Plasma Process LLC; Birmingham, Alabama-based Southern Research Institute; and West Nottingham, New Hampshire-based Invenetex Inc.



Pennsylvania-based Materials Research & Design Inc. delivered shape-stable nozzle throats for Mach 14 and Mach 18 testing to the Arnold Engineering Development Complex in White Oak, Maryland. This will forever change how high-temperature nozzles, used to advance hypersonic capabilities, are manufactured for Tunnel 9 at the complex, shown here.

SECURE MIGRATION TO THE CLOUD EXPECTED TO DRIVE DOWN INFORMATION TECHNOLOGY COSTS

Solid State Scientific Corp. | Nashua, NH

TRANSITION Success Story

The Air Force and a small business partner developed a way to cut IT-related costs by taking advantage of cloud computing on a wider scale.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, New Hampshire-based Solid State Scientific Corp. moved a software application to a secure web service platform for government users. Additionally, the veteran-owned small business capitalized on that success by securing millions of dollars in Phase III contracts – which draw funding from sources outside the Air Force SBIR | STTR Program – to perform work for several Air Force centers.

Developing this technology addresses an Air Force directive to migrate applications to the cloud, thereby reducing the need for physical data centers, according to Matthew Shaver, the CDIS Group deputy program manager at the Air Force Research Laboratory's Information Directorate in Rome, New York.

As the data center inventory shrinks – and hardware, software, utilities and building expenses are eliminated – the Air Force will be able to lower its total cost of cyber operations.

BEHIND THE TECHNOLOGY

Airmen, civilians and contractors perform many of their duties on the Air Force Network, also known as AFNet, which is supported by numerous data centers. These facilities are expensive, from the cost of their physical footprint and energy requirements to the labor needed for routine maintenance.

Cloud computing – the ability to store and access programs and data over the Internet, instead of within internally maintained servers – is a relatively inexpensive and abundant resource. However, Air Force mission leaders have been reluctant to migrate the applications they use to the cloud, mostly because of security concerns.

To help overcome those doubts, Solid State Scientific created an environment in the cloud that had the “look” of AFNet. It placed the network's familiar tools within the AWS GovCloud, an Amazon Web Services region restricted to use by U.S. agencies. AWS GovCloud allows government customers and their partners to move work into the cloud by addressing their specific regulatory and compliance requirements.

Standard security features – such as Assured Compliance Assessment Solution and CAC authentication – are intended to provide mission owners with a computing environment that conforms to Defense Information Systems Agency specifications.

Those specifications are designed to protect Air Force data and instill confidence in mission owners.

To fully demonstrate its approach, Solid State Scientific performed a complete migration of an Air Force application. With support from the Air Force SBIR | STTR Commercialization Readiness Program, the company is currently working to obtain an Authority-to-Operate the environment. That certification would allow the Air Force to use Solid State Scientific's infrastructure to migrate any application – within the same security class – to the AWS GovCloud environment.

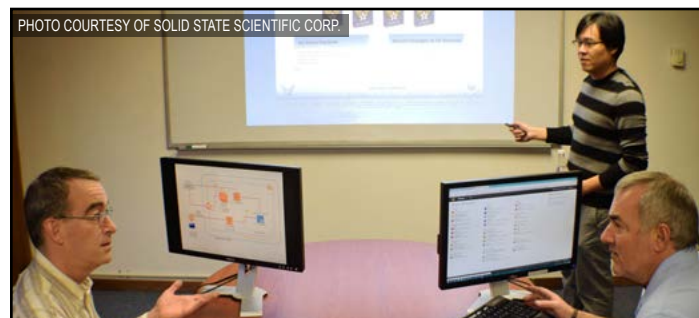
SBIR SUPPORT WAS VITAL

According to James Murguia, president and CEO of Solid State Scientific, Air Force SBIR | STTR funding enabled the company to demonstrate this layered security approach on the AWS GovCloud.

“It allowed us to interact with an Air Force program office, without needing money from them, and to find an application that the program office was interested in migrating,” Murguia said. “Then it allowed us to get a contract in place to fund follow-on work.”

Under Phase III contracts, which draws funding from sources outside the Air Force SBIR | STTR Program, that additional work is being performed at the Air Force Life Cycle Management Center and Air Force Sustainment Center on applications of an even higher security class than the original project.

This type of commercialization is critical because it ultimately helps drive down technology costs, bring new technology to the warfighter and stimulate the economy through small business growth.



New Hampshire-based Solid State Scientific Corp. is working with the Air Force to cut IT costs by allowing cloud computing on a wider scale. Here, Phil Dumont (left), Clement Wong (standing) and Stephen Spaziani of Solid State Scientific discuss the technology.

NEW TECHNOLOGY BOOSTS THE ABILITY OF GROUND-BASED TELESCOPES TO BE EYES IN SPACE

Hart Scientific Consulting International LLC | Tuscon, AZ

TRANSITION **Success Story**

If a satellite being used to spot camouflaged weapons systems was suddenly knocked offline, allied personnel in the field would immediately be in greater danger. The outage would be followed by a scramble for answers: Was the satellite damaged by debris or an act of sabotage? Could its functionality be restored or is the capability lost?

The most viable option for a quick assessment – pointing a high-power telescope at the satellite – would likely provide little more than blurred images. However, the Air Force and a small business partner may have solved that problem as part of a larger contribution to space situational awareness.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Arizona-based Hart Scientific Consulting International LLC developed software code that greatly improves the ability of large ground-based telescopes to see satellites in space. By applying this technology to view the satellite that went offline, for example, analysts would be able to see key features of the spacecraft and more quickly diagnose the issue.

Also known as DORA – for Daylight Object Restoration Algorithm – the technology is now being used at several sites operated by the Air Force Research Laboratory and is in the process of transitioning to the Air Force Maui Optical and Supercomputing Site in Hawaii, according to Ryan Swindle, a research physicist at AFRL's Directed Energy Directorate. The transition is scheduled to be complete in the third quarter of 2018.

BETTER SPACE SITUATIONAL AWARENESS

The U.S. has a growing, critical national interest in space. This includes maintaining the health of our orbital assets, and that of our allies, while being constantly aware of the capabilities and movements of spacecraft operated by adversaries.

Space situational awareness, the mission to keep tabs on space-based assets, is supported through a variety of sensors and other tools, including large telescopes. In theory, these telescopes should deliver high-resolution images of satellites. However, turbulent winds in the Earth's atmosphere degrade the quality of their images in the same way that leads to the twinkling of starlight.

Additionally, data collection with telescopes during the day is a challenge because the bright sky background masks satellite views. This restriction greatly hampers the timeliness of data collection on most satellites and makes it extremely challenging to collect any useful data on a particular class of strategically important satellites in sun-synchronous orbit.

DORA is designed to help offset atmospheric effects and overcome the restricted timing aspects of data collections, thereby restoring images to the sharpness as if a telescope were in space itself. This enables faster response times and a greater throughput by allowing telescopes to be operated more often and over a larger area of the observable sky.

As a result, the new technology provides space situational awareness analysts with more unobscured views of the objects they are attempting to see.

"The DORA program will have a major impact on space situational awareness by greatly expanding the range of conditions under which actionable information can be collected by existing, and future, Department of Defense facilities," said Michael Hart, president of Hart Scientific.

BEHIND THE TECHNOLOGY

In developing DORA, Hart Scientific fully exploited the physics of the image formation process and the behavior of the atmosphere that leads to image blurring. Many key elements of the new technology, which model physical principles of the image formation process, had never been tested before.

Funding from the Air Force SBIR|STTR Program allowed these tests to be carried out – both in simulation and with real data – so the elements could be successfully integrated into the final algorithm.

This project also allowed Hart Scientific to hire additional staff, expand its technical expertise and develop related products in optical hardware for wavefront sensing and adaptive beam control that are now part of the company's catalog.



U.S. AIR FORCE PHOTO

With support from the Air Force SBIR|STTR Program, an Arizona business has developed a software code that significantly improves the performance of ground-based telescopes. The new technology is being used at several sites operated by AFRL and is in the process of being implemented at the Air Force Maui Optical and Supercomputing Site in Hawaii, shown here.

3D PRINTING SOLUTION PROVIDES COST-SAVING SUSTAINMENT CAPABILITY

Triton Systems Inc. | Chelmsford, MA

TRANSITION **Success Story**

The Air Force has a new, time-saving tool in its ongoing effort to repair jet engines.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Massachusetts-based Triton Systems Inc. developed a 3D printed mask for a specific engine component in need of treatment before it can be returned to service. The reusable mask replaces a tedious manual taping process, thereby reducing labor and costs while increasing reliability.

3D printing, also known as additive manufacturing, is the process of building layers of material to create an object based on a digital design. The technology is growing in popularity because it's good for making low-volume, custom parts to avoid large tooling and mold costs.

Under a special type of SBIR | STTR contract – known as a Direct-to-Phase II award, offered by the Air Force Research Laboratory Center for Rapid Innovation – Triton Systems worked with the AFRL Materials and Manufacturing Directorate to streamline the preparation process for rebuilding a particular component.

The 76th Propulsion Maintenance Group at Tinker Air Force Base in Oklahoma is using the mask developed by Triton Systems in its jet engine turbine sustainment operations, according to Glen Drebes, engineering branch chief for repair and development.

BEHIND THE TECHNOLOGY

Portions of metal engine components are worn away during use and must be rebuilt through the sustainment process. Typically those components are manually taped, leaving only the worn area exposed for smoothing the rough surface and applying material.

Some components take up to six hours of taping prior to treatment. The idea behind reusable 3D printed masks is that they could easily snap on to expose only the desired area – cutting the application and removal time to minutes – while providing more consistency. In addition to reducing sustainment costs by cutting labor, these masks would also replace the acquisition time and higher costs option of using metal or silicone masking in the process.

During the Air Force SBIR | STTR project, Triton Systems tested the ability of multiple materials to mask a rotating part during a nickel aluminide application. After finding several that were acceptable, it printed a mask to cover a test part.

"Then, the company improved the design and added removable edges," Drebes said.

At the conclusion of the project, Triton Systems delivered the appropriate 3D printing machine and model for the mask. The mask has since been implemented into production of a low-volume part and is expecting to be used over the long-term.

Under the Direct-to-Phase II award, Drebes said another company provided a solution that is also being used by the 76th Propulsion Maintenance Group.

SBIR SUPPORT WAS VITAL

Funding from the Air Force SBIR | STTR Program allowed Triton Systems to develop its approach and secure materials needed to fabricate and demonstrate masks. The company ultimately designed five types of masks.

After collaborating with its Air Force colleagues, Triton Systems settled on one of the masks and made adjustments based on feedback about fit and convenience. The final mask design was tested in a real application to show its utility.

Based on the transition success, the company is discussing 3D print masking technology with other sustainment organizations within the Department of Defense. Triton Systems is also looking to widen the potential use of the masks by investigating ways to increase their temperature capability and compatibility with other materials.



During an Air Force SBIR | STTR project, Triton Systems tested the ability of multiple materials to mask a rotating part during a spray application process. The masks were created with a 3D printer and one of the masks is now being used in an Air Force sustainment operation.

TECHNOLOGY EXTENDS MAINTENANCE SCHEDULE FOR ASSETS IN HARD TO REACH PLACES

Infinite Technologies Inc. | Clearfield, UT

When putting together a radome assembly, which covers a radar or communication system, to protect it from harsh environmental conditions and allowing for its continued, uninterrupted transmission, safety and efficiency are paramount. Infinite Technologies Inc. has a tried and tested solution.

"Our office performs field maintenance and repair on shelters, radomes and towers for all major commands," said David Lindquist from the Engineering Directorate at Hill AFB, Utah. "There a lot of these assets that are located in some very harsh conditions. We've got some of these in very remote areas of Alaska, that get snow and ice blasting on them out in the middle of nowhere, up on the coast, in all environments, in corrosive and arid environments. Some of these sites are very expensive to get to - you have to take charter flights just to get to them - and it's tough to get material there.

According to maintenance personnel weather is one of their biggest challenges. Further, they note that the resulting cost associated with one action on a radome can be as much as \$75,000. As a result, reducing maintenance costs and the frequency with which maintenance occurs on these radomes can result in huge savings.

BEHIND THE TECHNOLOGY

Technologies, Inc., headquartered in El Dorado Hills, California, under the Air Force Small Business Innovation Research and Small Business Technology Transfer Program managed by Ogden Air Logistics Center resulted in an advanced composite radome technology that requires little to no maintenance.

"The technology [Infinite Technologies developed] effects the Air Force mission in that it provides greater operational time for the elements that are protected by these radomes," said Bob Spencer from Infinite Technologies. "Protection of the warfighter and warfighter safety is paramount. If they have to spend more time focused on maintenance, failing systems, or on trying to [maintain] the support [their systems should be providing], it makes it difficult for them, its time consuming, and it's very costly."

"When we first started working with the Air Force on the SBIR program, we had some ideas and concepts on fastening, as well as radome panels. [Our ideas consisted of] bringing panels together in a quick, rapid way," Spencer added. "The technologies that we've developed, have been proven, tested, and are providing lower cost systems, safer environments, and more reliable, durable hardware."

This technology reduces the initial time of installation and eliminates planned maintenance schedules, stretching them out significantly. Not only does implementation of the technology save time, but it also results in a reduction in manpower, and reduces the total life cycle for these hardware elements.

TRANSITION Success Story

"[Infinite Technologies] came in, they're experienced with radomes, they understood our issues, and they have been working with us to develop these new technologies to help reduce our maintenance costs," Lindquist recalled. "They've been a part of our team --a very good part of our team."

According to Lindquist, the Air Force conducted a cost benefit analysis to determine the impact of longer-life radome technology. The analysis showed that extending the maintenance from every 1 to 3 years to 9 years would result in a savings of \$130 million. Infinite Technologies' solution has exceeded expectations by extending the maintenance out to 15 years. As a result, the Air Force is evaluating a fleet wide replacement on one of the radomes for the Early Warning System. That endeavor alone could result in \$10 million in savings over the remaining life of the system.

SBIR SUPPORT WAS VITAL

"Our company has been solely funded for these technology developments by internal dollars, and by the Air Force's SBIR effort, including the Commercialization Readiness Program," Spencer said. "We would have never been able to make this happen without the Air Force SBIR program."

"When we first developed the technology, the government was our main customer. The Air Force, the Marine Corps, the Army, and the Navy have all been purchasing this technology from us and benefiting from it. We have also taken this technology and commercialized it, and [now] we provide it all over the world."



PHOTO COURTESY OF INFINITE TECHNOLOGIES

Research and development conducted by Infinite Technologies, Inc. under the Air Force Small Business Innovation Research and Small Business Technology Transfer Program managed resulted in an advanced composite radome technology.

AIR FORCE PARTNERSHIP WITH SMALL BUSINESS PROVIDES A BIG BOOST TO THE REUSABLE ROCKET INDUSTRY

Opto-Knowledge Systems Inc. | Torrance, CA

IMPACT Success Story

Reusable rocket manufacturers are beginning to adopt a new technology that will improve launch safety and reduce maintenance costs.

With support from the Air Force Small Business Innovation Research/ Small Business Technology Transfer Program, California-based Opto-Knowledge Systems Inc. developed a system to detect and analyze spectral emissions from the high-temperature combustion of rocket engine propellants. The Optical Combustion Analysis System, also known as OCAS, finds trace amounts of metallic elements that indicate wear or erosion of the engine components, pumps and combustion chamber.

Two major rocket engine manufacturers – Aerojet Rocketdyne and Blue Origin – have used OCAS in a test program and are exploring opportunities to incorporate the technology into their overall flight engine health management system.

BEHIND THE TECHNOLOGY

There is a big push to reduce the cost of space missions by developing reusable launch vehicles. The issue is that rocket engines operate in a harsh environment, so they can be susceptible to wear and failure. Engine wear typically occurs during start-up and shut-down as well as prolonged engine operation. Over several uses, the cumulative wear may be sufficient to warrant maintenance or replacement. OCAS provides immediate feedback on the level of engine wear and can be used to schedule targeted condition-based maintenance to further reduce costs and help to avoid catastrophic failures.

In the Space Shuttle days, NASA would completely dismantle the shuttle's main engines to inspect all the parts and then rebuild the engine to assure reliability and health. The process of complete refurbishment after each flight is not cost effective and contradictory to achieving true engine reusability.

The engine health management system is an integral component of the launch vehicle, and with OCAS it is able to identify potential wear sources during each launch or test of the engine. By detecting the potential wear source, and relating the wear based on the specific materials to specific components, engine operators can more accurately assess the engine status and schedule proper inspections and maintenance only when needed.

This process is expected to reduce time between launches, eliminate unnecessary and expensive maintenance operations, and mitigate launch failures.

SBIR|STTR SUPPORT WAS VITAL

The Air Force SBIR | STTR Program allowed Opto-Knowledge Systems to work with the Air Force Research Laboratory's Rocket Propulsion

Division – historically known as the AFRL Rocket Lab – at Edwards Air Force Base. That relationship provided the company an opportunity to test at one of the Rocket Lab's test cells using AFRL's lab-scale rocket engines. The result was a low-cost, rapid testing of concepts.

Opto-Knowledge Systems tested various sensors at Edwards and developed the software for data processing and for extraction of the trace elements in the exhaust plume. As a result of the project, AFRL encouraged the company to connect with domestic developers of rocket engines. That led directly to its work for the two commercial rocket engine manufacturers.

At NASA's Marshall Space Flight Center in 2017, Aerojet Rocketdyne completed a series of successful hot-fire tests on a Bantam liquid-fueled rocket engine built using additive manufacturing, also known as 3-D printing. The OCAS was integrated into the Bantam engine's injector and provided a baseline of useful optical data, according to James Larkin, diagnostics, prognostics and health management discipline lead at Aerojet Rocketdyne.

"In particular, the OCAS identified and quantified metal alloys that were present in the flow path during the combustion process," Larkin said. "Such knowledge enables informed diagnostic, prognostic and health management decisions."

Blue Origin also has been working with Opto-Knowledge Systems to bring the technology into its engine development programs.

"(OCAS) afforded us a new method to evaluate a test article's health with real-time analysis," said Yu Matsutomi, BE-4 engine test lead for Blue Origin. "This has helped us improve our failure detection capability and understanding hardware behavior change through the development process."



PHOTO COURTESY OF AEROJET ROCKETDYNE

Aerojet Rocketdyne completed a series of successful hot-fire tests on a Bantam rocket engine at NASA's Marshall Space Flight Center. The engine contained the Optical Combustion Analysis System, which was developed by a small business in partnership with the Air Force SBIR|STTR Program.

NEW SATELLITE COMMUNICATION TECHNOLOGY POSITIONED FOR WIDESPREAD USE

GATR Technologies | Huntsville, AL

IMPACT Success Story

The Department of Defense now has access to a portable antenna with tracking capability that can be deployed in places where these capabilities are traditionally limited.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program and the Air Force Research Laboratory, Alabama-based GATR Technologies developed a version of its inflatable antenna that can follow moving targets. Also known as GATR TRAC, the new antenna is relatively lightweight and has a low-stowage volume so it can be easily transported then quickly assembled.

Tracking antennas are used to communicate with satellites in non-geostationary orbits, as well as with other moving objects such as aircraft. However, legacy systems require a rigid dish with heavy-duty structural support making them difficult to use in many situations.

"The GATR TRAC system is a significant step forward over traditional satellite communication systems available today," said Peter Ricci, an engineer with AFRL's Information Directorate. "It affords the user the ability to easily transport and set the system up in remote areas where it once was logistically impossible."

GATR, which was acquired by Cubic Corp. in 2016, has already begun selling the new product to military and commercial customers.

BEHIND THE TECHNOLOGY

Early SBIR|STTR support from multiple organizations – including the Air Force and Missile Defense Agency – originally helped GATR to develop 1.2 meter, 2.4 meter, and 4.0 meter inflatable antennas to be anchored to the ground and fixed on communications satellites in geostationary orbit. The company has sold hundreds of these to the Department of Defense.

With more recent support from the Air Force SBIR|STTR Commercialization Readiness Program and AFRL, the concept was refined to create the 2.4 meter GATR TRAC. It features mechanical and electrical components in a ruggedized base with support arms that allow the antenna to track satellites moving across the sky.

To develop an inflatable tracking antenna, the company had to overcome the challenge of grasping a large flexible ball-shaped radome and pointing it accurately under varying weather conditions. The design evolution included improving reliability, creating a simple user interface, and upgrading assembly and disassembly procedures.

GATR TRAC has been demonstrated to reliably track satellites in low Earth orbit and produce usable imagery as part of a deployable ground station. It also has the ability to track satellites in other types of orbits.

The product packs into four cases that can be checked as airline luggage or shipped by traditional package delivery services, which lowers its cost of use while providing greater overall flexibility to mission planning. Assembly takes approximately 30 minutes.

SBIR|STTR-BACKED SUCCESS LEADS TO BIGGER THINGS

The company has already logged more than \$2.2 million in sales of the new tracking antenna to the military, as well as a commercial customer that supports the Department of Defense. With hundreds of projected CubeSats in low Earth orbit that will require tracking antennas, GATR TRAC is also well positioned for a potential boom in demand.

GATR's recent successes – from its acquisition by Cubic to sales of its latest portable tracking antenna – are a critical benchmark for participants in the Air Force SBIR|STTR Program. This type of commercialization helps to bring down costs and get technology to the warfighter while spurring the economy through small business growth.



With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, GATR Technologies developed a portable antenna with tracking capability. Shown here (in the foreground), the GATR TRAC packs into cases that are easy to transport compared to traditional antenna systems such as the one shown in the background.

VIRTUAL SOLUTION COULD REVOLUTIONIZE AIRCRAFT MAINTENANCE TRAINING

Charles River Analytics | Cambridge, MA

A Massachusetts-based company is building a virtual aircraft maintenance trainer for the Air Force that would allow for larger class sizes and troubleshooting scenarios that are difficult to present in a traditional live setting.

With support from the Air Force Small Business Innovation Research/ Small Business Technology Transfer Program, Charles River Analytics developed the underlying software and is refining it to provide maintenance training for the F-15E Strike Eagle. The technology combines high-resolution graphics with automated system feedback to teach complex maintenance procedures.

Working with the Air Force Research Laboratory, Charles River Analytics advanced the technology and then partnered with the Instructional Technology Unit at Sheppard Air Force Base in Texas to understand its needs for virtual maintenance training on the F-15E. According to 2nd Lt. Mitchell Lichtenwald, a program lead in AFRL's Airman Systems Directorate, this three-party collaboration is key in making progress toward something that has never before been accomplished in the maintenance field.

"Currently, you have to go to the flight line to actually teach something like this," Lichtenwald said. "This new effort is really about helping the warfighter to train better."

The company is in the early stages of a two-year effort to transition the technology and the expectations are that it will eventually be applicable to any aircraft.

THE NEED FOR A BETTER SOLUTION

Traditional maintenance training routinely costs the government in terms of manpower, upkeep and upgrades, while being limited to static content that does not address the needs of trainees with varied skills.

Classes are typically limited to fewer than 10 students per instructor with access to only a single aircraft near the flight line. To practice a procedure, students take turns as the instructor carefully observes in order to prevent catastrophic mistakes that could damage the equipment. In addition to students spending long periods of time observing each other, rather than executing procedures, this setting makes it difficult to illustrate broad troubleshooting scenarios.

By providing a virtual maintenance trainer—even just for familiarity training—instructors can manage more students, students can perform the procedures in parallel, and the system can monitor and address potential errors without the concern for costly system damage.

BEHIND THE TECHNOLOGY

Also known as MAGPIE – which stands for Maintenance Training Based on an Adaptive Game-based Environment Using a Pedagogic

INNOVATION Success Story

Interpretation Engine – the new system will be a combination of intelligent tutoring, game-based virtual training and intuitive scenario editing. Up to 20 students can be on the system at once.

Students using MAGPIE will also get to see things break, which is something that cannot easily be simulated in live training, according to Sean Guarino, principal scientist at Charles River Analytics.

The system includes an intelligent tutoring framework that identifies students who need the most instructor assistance, and recognizes and characterizes errors so students can focus on their individual learning needs. Additionally, the system will include a suite of authoring tools for course designers and instructors to readily extend and/or rearrange training content to improve scenarios.

AIR FORCE SBIR|STTR SUPPORT WAS CRITICAL

The successful completion of the initial Air Force SBIR|STTR project included a prototype of MAGPIE. When the transition for the F-15 is complete, the company expects to have a full-scope intelligent virtual maintenance training tool that can be readily adapted to any vehicle or aircraft.

Reaching that milestone will open a wide range of opportunities across the Department of Defense and commercial industry. Commercialization success, such as that, is a critical benchmark for participants in the Air Force SBIR|STTR Program as it helps to bring down costs and get technology to the warfighter while stimulating the economy through small business growth.



U.S. AIR FORCE PHOTO 2ND LT. MITCHELL LICHTENWALD

The Air Force SBIR|STTR Program supported development of a virtual aircraft maintenance trainer that is currently being adapted for the F-15E Strike Eagle.

DYNAMIC NETWORK SOLUTION SHOWS PROMISE TO WREAK HAVOC ON HACKERS

Intelligent Automation Inc. | Rockville, MD

INNOVATION Success Story

The Air Force has a new tool in its arsenal to combat cyberattacks.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Maryland-based Intelligent Automation Inc. developed the Self-shielding Dynamic Network Architecture. Also known as SDNA, the technology presents a constantly changing view to potential hackers. It is meant to complement existing cyber defense techniques that tend to be expensive and ineffective.

Because of its potential, the Air Force Research Laboratory and several federal agencies have provided funding to mature SDNA so it can be used for their specific needs. Additionally, Intelligent Automation launched another business that is selling the product commercially.

The company has secured more than \$5 million in Phase III work, which includes commercial sales and Department of Defense contracts. Phase III activity denotes funding from outside the Air Force SBIR | STTR Program and is a critical commercialization benchmark.

BEHIND THE TECHNOLOGY

Today's networks are highly vulnerable. A determined attacker can find many ways to get inside, bypass protection technologies and hack the intended targets.

For example, detection systems check signatures, behaviors and artifacts of known attacks, but do not protect against unknown attacks. Firewalls are good at stopping attacks from entering the network, but offer no protection once the attacker gets past them. Other techniques modify aspects of a network to improve resilience, but do not prevent against misuse of credentials or contain an attack once it starts.

SDNA prevents an attacker from targeting, entering, or spreading through a network by adding dynamics that present a changing view of the network over space and time. The system increases the attacker's effort, risk of detection and time required to successfully conduct an attack.

This happens in several ways.

First, an intruder is forced to spend significant resources to carefully guide attacks. Next, attempts to probe or map the network are thwarted by revealing views of the network which are sanitized, ambiguous, and time-varying, making both attack planning and detection avoidance more difficult.

Finally, the availability of services is time-varying based on user needs and credentials, limiting the connectivity of the network to only current mission-required paths. This impedes compromised devices and insider attacks.

SBIR SUPPORT WAS CRITICAL

The challenge in creating SDNA was to impose changing dynamics for an attacker while simultaneously hiding that from existing operating systems, applications, routers, switches and other components. Complete security could be achieved while making the network unusable, so the difficulty was in achieving a balance.

During the Air Force SBIR | STTR project, Intelligent Automation worked with AFRL's Information Directorate to mature SDNA into a system that could be deployed in a major exercise. A comprehensive management system was developed that enables network administrators to easily deploy, configure, visualize and debug an SDNA network with minimal disruption to end users and using existing network infrastructure.

Intelligent Automation's spinoff company – Cryptonite NXT – reported first year sales of approximately \$1 million and added five employees during that time. Company officials expect sales to more than double in the second year, which would spur the creation of even more new jobs.



U.S. AIR FORCE PHOTO ILLUSTRATION

With support from the Air Force SBIR | STTR Program, a Maryland-based small business developed technology that presents a constantly changing view to potential hackers.

AIR FORCE LOOKS TO PREVAIL IN SPACE WITH NEW AUTONOMY TECHNOLOGY

Orbit Logic Inc. | Greenbelt, MD

A small business in Maryland is helping the Air Force overcome barriers in satellite technology to gain the advantage in space.

With support from the Air Force Small Business Innovation/Small Business Technology Transfer Program, Orbit Logic Inc. developed software that shows promise to enable a satellite to consistently make its own decisions when ground contact is not possible. This added layer of protection – known as autonomy – is critical as an increasing number of satellites are tied to our national interests and can cost hundreds of millions of dollars each to launch into orbit.

Orbit Logic's technology is currently being validated at an Air Force Research Laboratory operations center, where it combines situational awareness feeds from a variety of active mission data sources to formulate satellite responses. Elements of the software architecture are also being integrated into an AFRL program for emerging urgent needs.

The Air Force SBIR|STTR Program invested \$2.4 million in the technology. So far, the company has leveraged an additional \$2.4 million in Phase III contracts, which represents funding from outside the SBIR|STTR program, and has grown by four employees because of the work.

BEHIND THE TECHNOLOGY

In the face of increased congestion and competition in space, missions will require satellites with significant capabilities including event detection and onboard decision making. Spacecraft that can spot and address threats and other issues autonomously – without the delays incurred by passing data to and from ground-based resources – will be better positioned to mitigate situations that could impact the mission or even the spacecraft itself.

During the Air Force SBIR|STTR project, Orbit Logic worked to design highly configurable autonomy planning software with plug-and-play capabilities that could solve complex space mission planning problems, reduce planning timelines and allow satellites to be more responsive to warfighter needs. The software developed by the company can be widely applied across a variety of missions.

To achieve mission flexibility, Orbit Logic built upon its modular software planning and scheduling architecture. That allows multiple numerical approaches to be independently applied to different aspects of decisions so highly-complex problems can be broken down into manageable pieces. Plans from each module are de-conflicted by a central module to ensure that system resources are not strained.

INNOVATION Success Story

The software enables the satellite to continuously be on the lookout for potential problems, such as a collision with another spacecraft or debris, then performs assessments of the options to determine the best response to execute.

SBIR SUPPORT WAS CRITICAL

The Air Force SBIR|STTR Program provided Orbit Logic with the opportunity to work in an AFRL-sponsored team activity using relevant operational use cases. The resulting software could push the envelope of space situational awareness and be applicable to a variety of upcoming missions.

In addition to significant opportunities with the Air Force, this project also opened the door for possible commercial sales. The company is currently in discussions with several commercial customers to apply the technology to their satellite missions.

"Our development of an off-the-shelf onboard planning solution for satellites is clearly a need that many customers in a variety of domains are currently seeking for their missions," said Doug George, vice president of Orbit Logic.



Technology developed by a small business in Maryland may allow satellites to act autonomously. This would offer better protection for spacecraft that are expensive and support critical national interests.

TECHNOLOGY SHOWS PROMISE TO CUT COSTS AND MAKE BETTER ENGINE BLADES

Mikro Systems Inc. | Charlottesville, VA

INNOVATION Success Story

A new generation of aircraft engine turbine blades that can be produced better, cheaper and faster than traditional components may soon be available to the Air Force.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Virginia-based Mikro Systems Inc. demonstrated a molding technology that allows rapid prototyping of blade designs and shows promise to be applicable to full-scale manufacturing operations.

Mikro Systems worked with Air Force Research Laboratory's Materials and Manufacturing Directorate to conduct multiple trials of the new technology to produce highly-complex cores and castings. Because of its success, the company attracted a Rapid Innovation Fund award from the Air Force to further industrialize the technology and position it for a transition to the market.

BEHIND THE TECHNOLOGY

The demand for higher performing turbines that last longer and can be made cost effectively puts tremendous pressure on the supply chain.

Mikro Systems developed the TOMO manufacturing platform – short for Tomo-Lithographic Molding – to address manufacturing for next generation products. It combines established tooling techniques from machining, lithography and molding in a unique way to create lower-cost, faster and highly-complex tooling.

TOMO technology can be leveraged to support advanced designs while dramatically reducing the cost of high-end components that are at the limit of the current supply chain production capability.

The company touts that TOMO can typically cut the cost of highly-cooled airfoils by as much as 30 percent, which would have a significant impact on the engine costs if applied to high-

profile aircraft programs. Additionally, the lower-cost, quicker-turnaround tooling can be used for end-of-life product needs or cold-start production.

THE IMPACT OF SBIR|STTR

Air Force SBIR | STTR support was critical in maturing the technology and demonstrating its use in aerospace applications.

Mikro Systems was able to attract original equipment manufacturers in the aerospace industry to participate in development programs. Those OEMs were able to view the capabilities of the technology and support the effort as part of the Air Force SBIR | STTR stakeholder group.

Mikro Systems then used the TOMO to quickly and cost-effectively produce complex components as part of an iterative development program, which significantly mitigated risks and helped position the technology to meet market needs.

The company leveraged its success under the Air Force SBIR | STTR Program, applying the technology to additional aerospace applications for complex components, component cost reductions, and development cycle time reductions. As a result, Mikro Systems has expanded its facilities, added jobs and is projecting growth in the coming years.



PHOTO COURTESY OF MIKRO SYSTEMS

A close up showing a layer of a generic TOMO master tool.

AIRCRAFT RETROFIT KIT PROVIDES QUICK, LOW-COST ACCESS TO PROGRAMMABLE UNMANNED SYSTEMS

RE2 Inc. | Pittsburgh, PA

CONCEPT Success Story

Air Force commanders will have greater flexibility to support the warfighter by quickly transforming conventional planes into unmanned systems – and back again – through a technology being developed with support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program.

Pennsylvania-based RE2 Inc. developed the Common Aircraft Retrofit for Novel Autonomous Control to enable the low-cost, temporary deployment of unmanned aircraft. This capability, known as CARNAC, could widely expand the tactics and strategies available in battlefield situations by replacing a seat in a normally manned aircraft's cockpit with a robot.

For example, getting supplies to forward operating bases is a dangerous task requiring ground convoys or traditional aircraft passing through hostile territory. Being able to resupply those positions with an unmanned system, using relatively inexpensive aircraft adapted from existing fleets of military or civilian aircraft, would enhance our ability to support the warfighter without further endangering other troops or risking the loss of expensive, custom-built unmanned aircraft.

Under a special type of SBIR | STTR contract – known as a Direct-to-Phase II award, offered by the Air Force Research Laboratory Center for Rapid Innovation – RE2 Inc. is working to advance the system. The company recently demonstrated the technology in an FAA approved simulator and is assessing potential users across the Air Force and Department of Defense.

“Non-invasive approaches to robotically piloted aircraft using existing commercial technology and components offer the benefits of unmanned operations without the complexity and upfront cost associated with the development of new unmanned vehicles,” said Dr. Alok Das, AFRL Senior Scientist and leader of the AFRL Center for Rapid Innovation. “Unmanned, low cost cargo transportation, resupply, refueling, and ISR missions are envisioned applications of this technology.”

BEHIND THE TECHNOLOGY

The development of CARNAC focused on creating a drop-in solution to operate the existing controls of an aircraft. That led to a robotic “pilot” that could quickly be installed without making modifications to the aircraft, relying upon onboard power, or connecting to a fly-by-wire system. If successful, CARNAC would provide an affordable way to bypass the cost of developing a new airframe from scratch.

Taking advantage of the fact that existing aircraft are all designed around human pilots, RE2 replaced the pilot with a combination of off-the-shelf and custom mechanical and electronic hardware controlled by an autonomous system. The system is programmed to follow standard flight rules and the aircraft's operating handbook while completing a user-defined

mission, all the way from takeoff to landing.

Through the use of robotic manipulation capabilities, dedicated custom actuation, vision-based flight-status recognition and cognitive architecture-based decision making, CARNAC interfaces with the same physical controls that a human pilot uses, including a cockpit's rudder pedals and yoke. Dedicated actuators and a robotic arm that can mimic human dexterity manipulate controls and respond to standard on-board gauges.

A camera and range sensor are mounted to the robotic arm's end effector, allowing the system to perceive and process the state of controls and make modifications when necessary.

SBIR|STTR SUPPORT WAS CRITICAL

Air Force SBIR | STTR funding for the project allowed RE2 to assemble an expert team in the areas of autonomous decision making, vision processing and manipulation then develop an approach to a drop-in kit that could flexibly adapt to different aircraft.

With feedback from the government, testing in a commercial motion simulator and continual development, CARNAC has progressed to a system capable of takeoff, normal flight, responding to emergencies and landing. It can be re-tasked during flight and a pilot can take over the controls and remotely operate the aircraft, if needed.

The CARNAC project has led to additional programs and research for RE2, which is also working to develop a similar robotic system for the Air Force to be used on the ground in existing construction vehicles. Those vehicles could then be used for clean-up after an airfield strike, reducing troop exposure to exploded ordinance.



PHOTO COURTESY OF RE2

Engineers from Pennsylvania-based RE2 Inc. work on technology to enable the low-cost, temporary deployment of unmanned aircraft. Air Force SBIR | STTR funding allowed the company to assemble an expert team to create a drop-in solution to operate the existing controls of a manned aircraft.

ADVANCED PARTICLES OFFER POTENTIAL FOR BETTER SECURITY FOR SPECIAL OPERATION FORCES

NanoScience Solutions LLC | Arlington, VA

A new technology developed by a Virginia-based small business could revolutionize the process of tagging and detection during field operations.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, NanoScience Solutions LLC created ultra-bright infrared fluorescent particles. Labels made from the particles are invisible without the use of special flashlights and goggles, so they cannot be detected by enemy forces.

This advancement can provide an advantage to special operations forces, who currently use ink or paint to mark landing lines that can't be seen through dust or clouds. The particles could also help distinguish friendly forces from adversaries in combat, detect disturbed soil as part of perimeter security and provide a better alternative to tracking of assets, objects and targets.

In addition to being the brightest of its type, production of the particle is scalable and affordable, according to the company.

BEHIND THE TECHNOLOGY

Traditional luminescent materials aren't bright enough to be used for complex tagging and detection needs. They also tend to be very unstable in daylight and prohibitively expensive for use in field work, which prompted researchers to consider developing these new materials.

Covert tagging with infrared, as a general concept, was attempted several years ago. For example, U.S. soldiers in Iraq were marked with an infrared glowing tag – an American flag – that was visible with standard night-vision goggles. However, within weeks those tags were being sold on eBay. As it turns out, the use of standard infrared reflectors and standard goggles was the problem.

NanoScience Solutions used Air Force SBIR|STTR support – and partnerships with Clarkson University and Tufts University – to advance the technology from a concept to a commercial prototype. It has developed ultra-bright infrared luminescent particles that meet Air Force requirements and are brighter than any other particles that currently exist. Those particles shine infrared light of a special color that can be seen during the day or at night, but only when using special flashlights and goggles.

After use, the particles turn into sand-like grains which are impractical to distinguish from regular sand.

CONCEPT Success Story

"Even if the particles were replicated by enemy, the developed platform allows us to change the spectral signature of the particles thereby frustrating attempts to duplicate or counterfeit them," said Yuri Liburkin, CEO of NanoScience Solutions. "As a result, we simply would use another special filter attached to night vision goggles that match the spectral signature of our new particles. The tags will again be invisible to potential foes."

Next, a manufacturing process that could be applied to large-batch production of the particles was developed.

COMMERCIALIZATION POTENTIAL

The phenomenon of ultra-brightness has yet to be fully understood and emerges from an overlap between physics and chemistry at the nanoscale. The advancement of ultra-bright luminescent particles could impact a variety of industries.

NanoScience Solutions is currently looking to test the new particles in the field to generate military sales and is working to apply the particles for different applications, including biomedical imaging and the early detection of cracks in metal construction.

"The technology is a real breakthrough. Its cost is negligible compared to the nearest rival particles, for example, quantum dots," Liburkin said. "The developed particles can be used as pigments in paints, sprays, crayons, markers, etc."



PHOTO ILLUSTRATION COURTESY OF NANOSCIENCE SOLUTIONS

With support from the Air Force SBIR|STTR Program, a small business created ultra-bright infrared fluorescent particles. Labels made from the particles are invisible without the use of special flashlights and goggles, so they can help distinguish friendly forces from adversaries in combat, as depicted here.

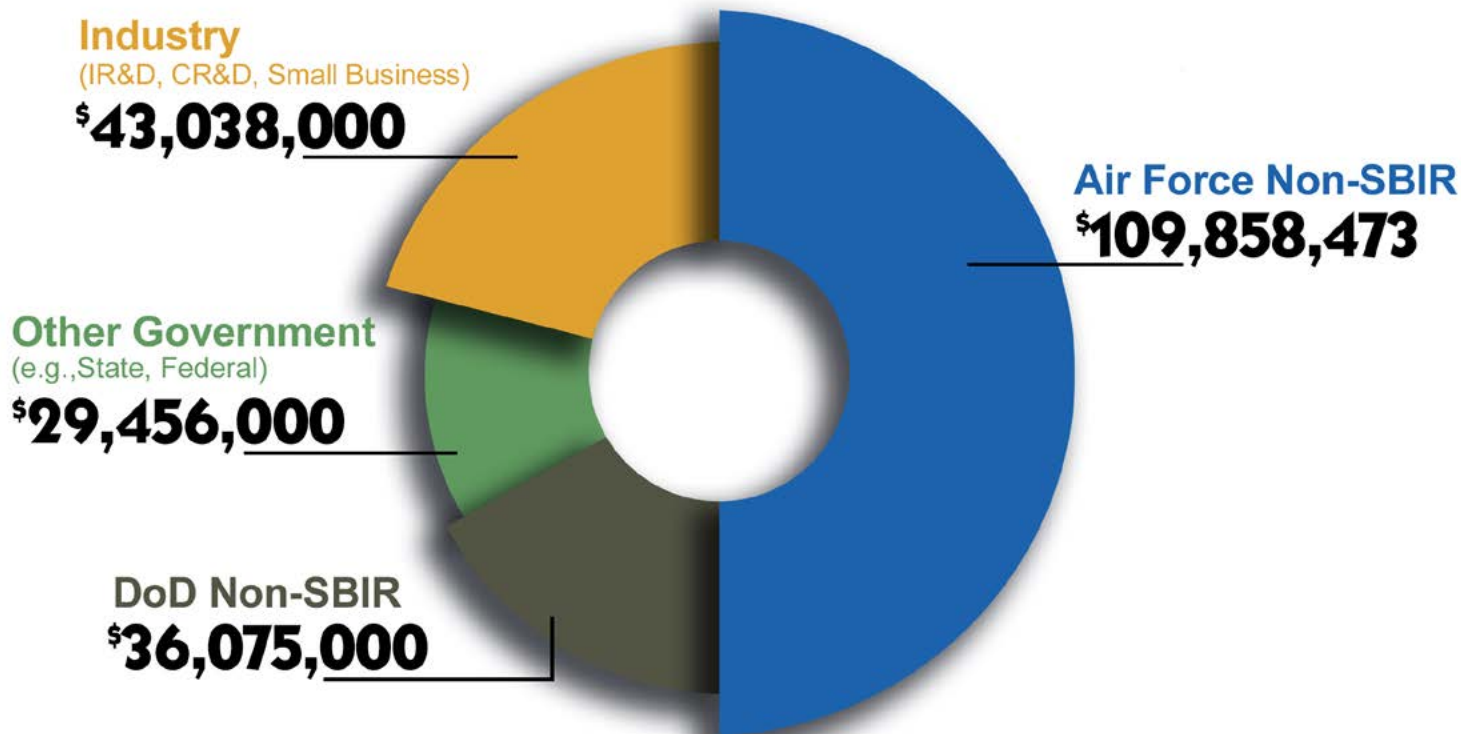
COMMERCIALIZATION **Readiness Program**

The Air Force SBIR | STTR Commercialization Readiness Program provides a strategically driven process that helps focus SBIR and STTR topics on high-priority technology needs and works with small businesses, program offices, SBIR | STTR program managers, technical points of contact, and industry technology integrators to accelerate technology transition. Each year, the Air Force dedicates one percent of its overall SBIR | STTR budget to its Air Force SBIR | STTR CRP efforts.



AIR FORCE SBIR | STTR BREAKDOWN OF Funding Leveraged

Since its inception in 2006, the program has been improving technology transition outcomes by accelerating the transition of SBIR | STTR-developed technologies into real-world military and commercial applications. The Air Force SBIR | STTR CRP team is involved from the generation of the SBIR or STTR topic to the transition of the topic's technology to military or public sectors. The Air Force SBIR | STTR CRP achieves success by aligning and connecting transition stakeholders, and leveraging the funds required to mature SBIR | STTR projects.



TECHNOLOGY Transition Plans

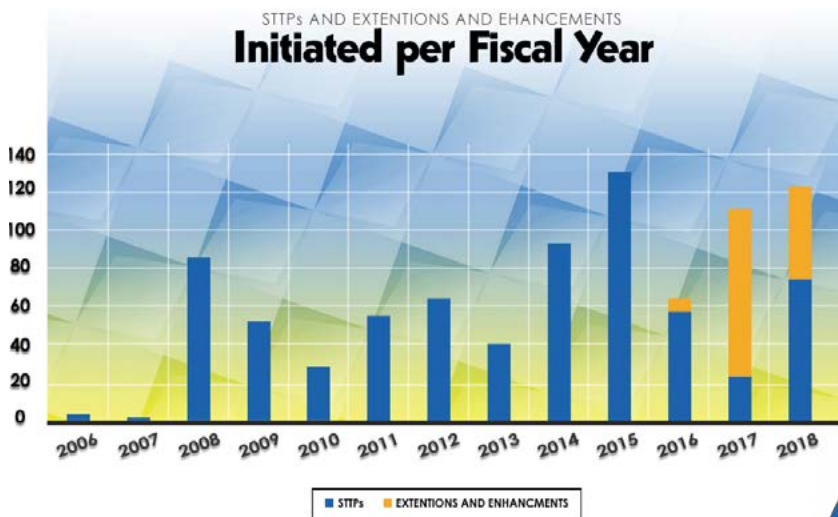
Technology Analysts also known as TAs, are on-site at various Air Force bases supporting partners including PEOs, program offices, the Air Force Research Laboratory, and others. The TAs work closely with these organizations to help implement the entire SBIR|STTR process, from topic generation to facilitating the transition of resulting technologies. This close working environment allows the TA to have a better understanding of the customer and their needs. The TAs are fully engaged as the program's boots on the ground supporting the Air Force Life Cycle Management Center, Air Force Sustainment Center, Space and Missile Systems Center, Nuclear Weapons Center and the Air Force Test Center. The TAs also support the Joint Strike Fighter Program as well as the nine technology directorates (TD) within AFRL. With changing leadership and policies, the TAs remain a constant resource for the PMs at these Centers/PEOs and TDs.

In addition, the TAs also work with small businesses, system program offices (SPOs), SBIR|STTR Program Managers, technical points of contact (TPOCs), and industry technology integrators to identify and document the transition planning through enhancement packages and non-binding SBIR|STTR technology transition plans (STTPs) for high transition potential projects. These plans identify critical stakeholders, their roles and responsibilities, technology and manufacturing readiness levels, tasks and timing, funding sources, and risk mitigation to support SBIR|STTR technology transition.

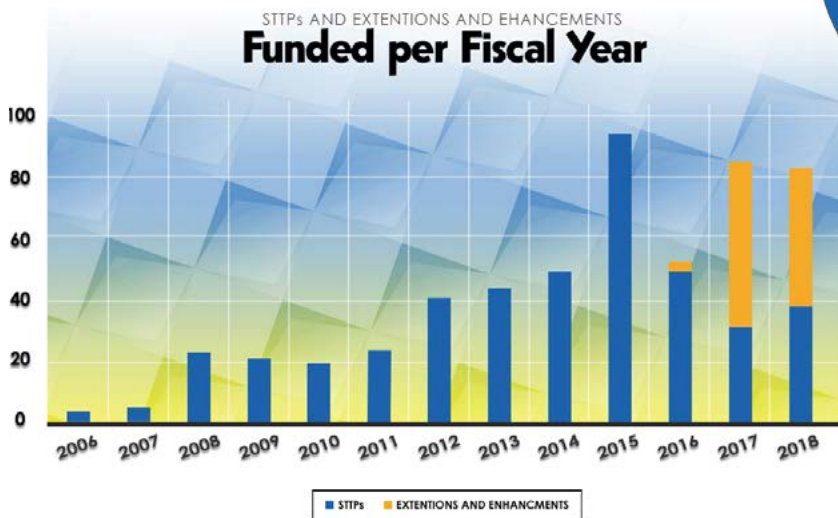
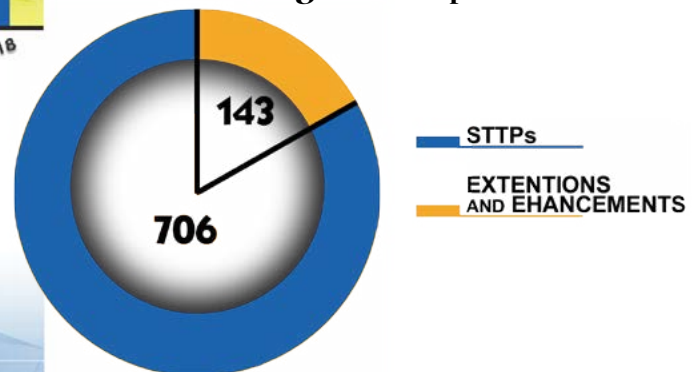
In 2018, 83 projects were approved for Air Force SBIR|STTR CRP funding. The total SBIR|STTR funding on these CRP projects was \$140.6 million and the total non-SBIR|STTR funding was \$218.4 million. SBIR|STTR funding includes Phase I, Phase II, and enhancements to Air Force SBIR|STTR CRP approved projects. Non-SBIR|STTR funding sources include industry's Independent Research and Development (IR&D) organizations, SBIR|STTR firm investment, Air Force Programs of Record, AFRL core budget, DoD transition funds, and state small business funds.



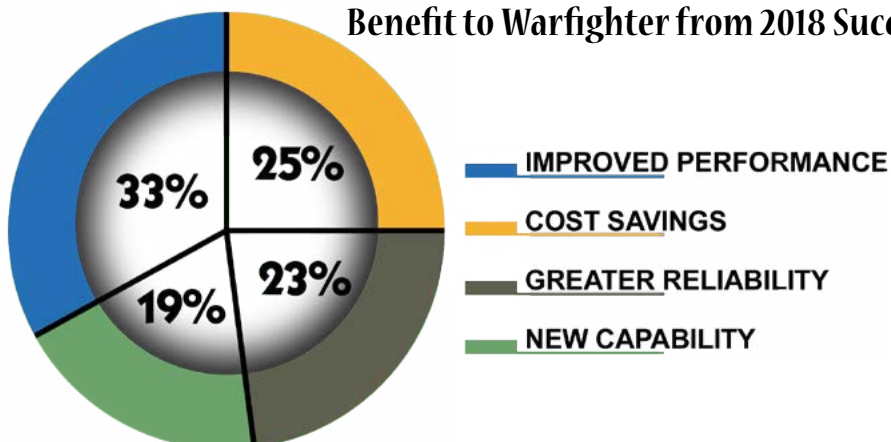
The Air Force SBIR|STTR CRP approach brings together key stakeholders utilizing Air Force SBIR|STTR CRP technology analysts to help focus SBIR|STTR topics on high-priority technology needs.



Total STTPs and Extensions and Enhancements Initiated Since Program Inception



Benefit to Warfighter from 2018 Successes



FY 2018 Transition Successes

During 2018, 29 projects were reported as a success, adding to the 143 successes reported through 2017 that have continued to mature and yield benefits. To be considered a transition success, a project must lead to the production and delivery of products, processes, technologies, or services for sale to or use by the federal government or commercial markets. Transition successes are providing significant benefit to the nation's warfighters in improved performance, new capabilities, increased reliability, and cost savings.

Each transition success and its benefits are briefly described here:

STTP 2007-03 | ODIS, Inc.

A Novel Long-wavelength Infrared (LWIR/UV) Sensor with Integrated Detector Multiplexing | AF05-029

Provides a multi-access capability for laser communication while providing use across multiple communication satellite platforms. This system enables classified military and federal platforms the ability to increase miniaturization, allowing for decreased power requirements, reduced circuit design complexity, and saved circuit space.

STTP 2008-62 | CAP Wireless, Inc.

Efficient High Frequency Electromagnetic Source for Communication Devices | AF04-218

Provides more reliable power supplies and amplifiers for Band 6 and 7 of the AN/ALQ-161A Defensive Avionics Subsystem. With this innovation, the Air Force is able to reduce operating costs and provide longer service/fewer repairs to the system. The technology is also available for federal and commercial use.

STTP 2009-30 | ODIS, Inc.

Monolithic Infrared Pixel Structures Enabled by Thyristor-HFET EO Logic | AF083-207

Using a new wafer manufacturing process, both optical and electrical devices are being integrated on the same wafer, while still providing the required isolation specifications of each device. This allows multiple access capability for laser communication across several communication satellite platforms, increased miniaturization, reduction in power requirements, and decreased circuit design complexity.



Since the inception of the program, 172 Air Force SBIR|STTR CRP projects are considered transition successes and are providing significant benefit to the nation's warfighters in improved performance, new capabilities, increased reliability, and cost savings well exceeding the investment. Each project meets the technology needs of at least one Air Force system with total cost savings estimated at over \$1 billion.

STTP 2009-31 | Nokomis, Inc.**Remote-Controlled IED Detection Identification and Classification Algorithms (RADICAL) | AF071-219**

Provides the capability to detect, identify, and geo-locate IED threats, thus reducing the threat to warfighters significantly by making the use of electronics a severe liability for the adversary. This technology is integrated into the Hiawatha I and Hiawatha II, both currently commercially available to the federal and commercial communities.

STTP 2012-21 | Pointwise, Inc.**Integrated Overset Meshing and Grid Assembly Capability | AF083-259**

This effort matured the integrated overset meshing and grid assembly software tool through the addition of component body management tools designed for complex configuration analysis. This tool enables modeling and simulation (M&S) engineers to quickly and efficiently setup the simulations and greatly improves the productivity of M&S engineers overall.

STTP 2013-22 | Vulcan Wireless**Modular Cubesats and Component | AF093-088**

Provides low-power software defined radios for small spacecraft. The modular cubesats and component technology has been integrated into a launch vehicle designated by Space Test Program (SMC/AD), into the Swedish government via AAC Microtec's Hyperion SSA Camera, power supplies, and software monitors, and is also commercially available.

STTP 2014-23 | DragoonITCN**Bus Characterization and Integrity Toolset (BCIT) enhancement to add Digital Video Interface (DVI) Cable Testing Capabilities | AF03-094**

Expands the capability of current BCIT test tool to encompass DVI cable characterization specifically tailored to the B-1B Integrated Battle Station (IBS) requirements. The technology miniaturizes the network analyzer functionality and provides a reliable test tool that can be employed in almost any platform, cockpit, lab, or shelter. This new capability fully characterizes connectorized cable sets and the cost savings realized by implementing a cable set that is free of defects is significant.

STTP 2014-25 | Busek Co., Inc.**Compact Low Mass Propulsion for Responsive Space | AF093-070**

Allows high magnitude change in velocity primary propulsion for volume constrained spacecraft and improves SmallSats maneuverability, to include both responsive orbit transfer and de-orbit compliance. Technology has also resulted in a significant reduction in the power processing unit (PPU) mass and volume when compared to other state-of-the-art PPUs.

STTP 2014-26 | CFD Research Corporation (CFD)**Multi-Fueled Enzymatic Fuel Cell | AF121-131**

A low-signature, high-energy density, battery recharging system which uses a unique enzymatic fuel cell that can be instantly powered by diverse and readily available fuel sources. This system significantly reduces the number of batteries needed and provides flexibility by bringing battery charging to the individual soldiers. This technology has been integrated into new applications such as miniaturized biological fuel cell on a Beetle and has gotten the attention of Army Special Operations.

STTP 2014-35 | Energy Quest Technologies, Inc.**Energy Efficient Mobile Air Conditioner | AF112-219**

This technology provides an effective supply of power and air conditioning, but is also being considered by other potential users for its dehumidification capability which can be used for mitigating corrosion-caused failures in airframes and avionics failures, which are accelerated by aircraft washes and operations in humid climates. The new air and power system improves efficiency and reduces fuel consumption by 66 percent.

STTP 2014-44 | Opto-Knowledge Systems, Inc. (OKSI)**Quantum Cascade Laser for Gas Diagnostics | AF073-134**

Enables improved combustion and flow-field diagnostic capabilities for Air Force Test Center applications, to include providing relevant information for the development and qualification of next-generation aircraft, missiles, and rockets.

STTP 2014-48 | Clear Science Corp.**Virtual Flight Testing with DoD CREATE-AV Software | AF073-142**

This software builds accurate models allowing analysts to determine areas of concern and focus flight test resources accordingly. It also facilitates better analyses of military aircrafts, higher performance, more reliable modeling and simulation operations, and reduced program costs through shortened test and evaluation cycles. This technology is being implemented into the DoD High Performance Computing Modernization Program (HPCMP) CREATE-AV.

STTP 2014-53 | MMA Design, LLC**Multi-functional Membrane De-Orbit Module and Deployable High Gain Reflectarray (DaHGR) | AF083-198**

Incorporates an additional structure and radio frequency capabilities into the heritage deployment system which also function as a dragnet de-orbit system. This technology enables missions to be executed on smaller satellites and launched in small launch vehicles, supports higher frequencies without significant increase in labor, requires 33 percent of the number of parts needed in previous systems, and decreases costs to the Air Force by 50 percent. The DaHGR system is commercially available for federal and commercial use.

STTP 2014-55 | Space Micro, Inc.**Modular, Advanced Rad Hard Avionics for Integrated Vehicle Fluids (IVF) Enhanced Launch Vehicles | AF081-094**

Modular, advanced radiation hardened avionics are used for launch vehicles to enable avionics for the development of IVF and supply an IVF controller. IVF is a fully block redundant system without high pressures or toxic materials, functions for maximized redundancies, incorporates an active temperature stabilization for the controller and integral battery, eliminates the principle causes of electronic hardware and battery failure, and has a lower cost. The technology has transitioned to TACSAT 2, ORS-1, NASA MISSE-X, classified operations, payload sequencers, and other uses within the commercial space.

STMP 2014-AA | Matsys, Inc.**Novel Hybrid Structural Reactive Composites | AF112-108**

Consolidated metal reactive materials with mechanical properties comparable to inert materials, provides additional enabling capabilities for enhanced blast and impulse for warhead development, and induces selectable effects in support of guided bombs by adding reactive materials for the secondary blast to increase pressure.

STMP 2014-AE | L-3 Mustang Technology, L.P.**Affordable High Performance Millimeter Wave (MMW) Seeker Technology | AF083-093**

Provides a mature automatic target acquisition approach that allows the Air Force Guided Smart Seeker to enter into closed loop tracking without a human in the loop, intelligent target clustering giving the seeker more robust target tracking and false alert rejection, and provides a more affordable and higher performance solution.

STMP 2014-AG | Intrinsix**Readout Integrated Circuit (ROIC) Technology for Strained Layer Superlattice Photodetectors | AF093-160**

Provides a new ROIC technology with a system-ready design, higher performance, reduced power requirement, and is highly configurable depending on the needs of the application.

STTP 2015-14 | Mainstream Engineering Corporation**Transportable, Pyrolytic Waste-to-Fuel (WTF) Converter | OSD12-EP2**

Transportable WFC for the conversion of waste biomass to renewable fuel oil for heat and power applications. This technology eliminates waste, generates on-site renewable energy at installations, minimizes fuel convoys to expeditionary bases, and improves soldier safety and operational effectiveness by simplifying waste management logistics, and helping mitigate the risk of power outages.

STTP 2015-28 | Valley Tech Systems, Inc.**Affordable Solid Propellant Post Boost Propulsion System (PBPS) for a Future Intercontinental Ballistic Missile (ICBM) Weapon System | AF141-086**

The new PBPS technology provides the Air Force with a non-toxic solid propellant alternative to liquid propulsion systems, improved affordability, accurate targeting performance and technology commonality with Navy technologies. It also delivers affordable, long-duration storage and a modularized PBPS for the future Ground Based Strategic Deterrent flight system.

STTP 2015-30 | Active Signal Technologies, Inc.**High Power Density Transducer for Frequency Agile Extended Range Pyrophoric Flow Control Valve (ERPv) | N97T-003**

New wide flow range enabled by the ERPv improves temporal infrared target acquisition of enemy missiles by enhancing the capability of the Air Force Towed Airborne Plume Simulator (TAPS). Improved control at lower flow rates translates to the ability to station TAPS closer to the aircraft under test while still providing the correct irradiance signature, and the time reduction allows for more TAPS simulations to be performed during a single sortie and greatly increasing test tempo and efficiency. This technology is used operationally with Allied Forces, but is currently a classified effort.

STTP 2015-33 | nGimat**Manufacturing Scale-up of High-purity Optical Ceramics | OSD04-L01**

Provides high-quality optical ceramic nanopowder materials for laser weapon systems and transparent missile domes for use by the Air Force and in other defense applications. The new technology is of higher quality, has improved performance, and is being used in state-of-the-art weapons and missile defense systems with higher-power outputs at lower costs.

STTP 2015-63 | Securborator, Inc.**Annotated Semantic Engine for Information Retrieval (AnSER) | AF13-AT14**

Provides a dynamic search engine that significantly enhances Air Force and Defense Technical Information Center (DTIC) users ability to discover, analyze, and retrieve highly-relevant scientific and technical materials from DTIC's vast science and technology information collections while also significantly reducing the omission of relevant research information due to terminology differences.

STMP 2015-BG | Ascendant Engineering Solutions, LLC**Miniature Stabilized Gimbal Laser Pointing System (MSGPLPS) | AF141-130**

Technology enables hand-launched unmanned aerial systems (UAS) to have precision laser targeting capability and confirmation of laser spot on target. This provides an enhanced find, fix, Finish, exploit, analyze and disseminate capability when only small hand-launched UAS assets are available, effectively increasing battle space awareness and improving pursuit and denial capability for the warfighter.

STMP 2015-J | Performance Polymer Solutions, Inc.**Fabrication and Process Optimization of Thick Laminates from Carbon FiberPolyimide Composites | AF121-115**

Provides high-temperature polymer matrix composites that can be used as a replacement for titanium. These advanced materials trim the weight of some parts and systems in aircrafts by as much as 40 percent, resulting in annual fuel savings of hundreds of dollars per kilogram of titanium replaced, while also offering increased service life and improved fatigue resistance.

STMP 2015-W | First RF Corporation**High-Speed Weapon Radomes | AF121-092**

Seeker antenna for the high-speed strike weapon boost glide flight profile can endure harsh environmental factors and meet electrical requirements, with improved performance and greater reliability.

STTP 2016-09 | LSP Technologies, Inc.**Laser Bond Inspection (LBI) for Composite Aircraft | AF071-126**

Provides a technique for inspection of thick, multilayer composite structures, bonded structures with non-parallel surfaces, and mixed-material joints. Provides new capability to implement LBI in an original equipment manufacturer (OEM) facility, the elimination of recurring structural proof-load tests, a manufacturing cost reduction for composite aircrafts, and an increase in manufacturing robustness, reliability, and inspection capability.

STTP 2016-10 | ROCCOR, LLC**Deployable Structural Booms for Small Satellite (SmallSat) Antennas | NASA12-1 S2.02-8990**

Provides a low-cost, compact, high-precision deployable boom to access "Wi-Fi" data rates for tactical communications using SmallSat platforms. ROCCOR's deployable boom supports other key Air Force Service Core Function (AFSCF) initiatives in space and nuclear deterrence technology development and is commercially available.

STTP 2016-17 | Defense Research Associates, Inc.**Missile Warning Technology Maturation | AF071-213**

Advanced missile warning sensors (MWS) provide enhanced detection and identification of targets at long standoff ranges and help protect valuable airborne assets against a variety of air threats. With this new technology, unit costs have drastically reduced by using low-cost optical sensors with high-resolution detector arrays, performance of angular accuracy has improved, and there is greater reliability.

STTP 2017-21 | Voss Scientific, LLC**Simulation Software for Strongly Coupled Plasma | AF11-BT23**

Next generation plasma physics modeling tools allow engineers to design robust commercial systems operating in extraordinary temperature, density, and charge-state environments supporting spacecraft and nuclear fusion programs. Technology allows for more robust spacecraft component designs and the ability to analyze a vast array of experimental devices, representing a significant savings compared to a build-test-redesign iterative process.

SMALL BUSINESS Industry Days

Pioneered in 2014, the SBID events are an exemplary way of how the Air Force reaches out to work with small business. The SBID events highlight existing small business products and capabilities, Air Force contract opportunities, and technology development prospects by matching stakeholders from centers/PEOs, large business, and small business communities. They also provide benefits to small businesses, major defense contractors, and the Air Force by creating partnerships that can increase small business participation in the Air Force acquisition process.

The first five events were hosted by the Armament Directorate on 29-30 July 2014, Air Force Test Center on 18-20 November 2014, Air Force Sustainment Center on 14-15 July 2015, Air Force Space and Missile Systems Center on 18-20 October 2016, and Air Force Test Center on 7-9 November 2017. In 2018, the Air Force SBIR | STTR CRP team leveraged their experience, continued to refine the process, and successfully executed another event co-hosted by Air Force Sustainment. This event, held 31 July-2 August 2018, had 235 attendees from small businesses, MDCs, and multiple government organizations. Of the attendees, 14 percent of the small business represented had never before worked with the Air Force.

Also at the Sustainment event, eleven small businesses were selected by the Air Force to brief their capabilities, and 30 firms were specifically invited by the Air Force to participate. In addition, over 35 one-on-one meetings were conducted regarding upcoming DoD Broad Agency Announcements and potential SBIR | STTR projects that could be transitioned into programs of record.

In addition to the traditional layout of events, a unique meeting with Navy and Air Force SBIR | STTR leadership tackled collaboration between the programs. In a three-hour brainstorming meeting, key Air Force and Navy stakeholders shared their significant sustainment needs, discussed technologies that might meet both agency's needs, and identified ways to pool resources for rapid transition of technologies to meet critical needs.

Over the course of these five events, the government and major defense contractors attended 520 one-on-one sessions with small businesses, viewed over 185 exhibits, and participated in over 55 educational briefings for Industry. Based on event feedback, Small Business reported being in a better position to do business with the program, etc. The Air Force will continue using these events to identify and increase small business presence in the acquisition supply chain and to simultaneously incorporate new technologies by blending SBIR developed technologies into Air Force Programs of Records.

Upcoming SBID information can be found at: <https://afconference.brtrc.com/AFSBID/>



"[Small Business Industry Days provide a] good forum to exchange ideas with appropriate individuals for future requirements and ideas."

**— 2018 Air Force Sustainment SBID
Small Business One-on-One Participant**



235 attendees
representing small business,
major defense contractors and
government officials

TECHNOLOGY Interchange Meetings

The goal of the TIMs is to establish a general process conducive to shepherding SBIR|STTR developed technologies for transition to support the warfighter. Establishing partnerships between relevant stakeholders allows for a greater probability of return on investment for SBIR|STTR topics.

Since their inception in 2008, 16 different MDCs have requested and participated, most of whom, after experiencing success, have participated more than once. The outstanding support continues to grow, and this is clear each year through the addition of new organizations, incorporation of new business units, and inclusion of new subject matter experts.

To facilitate, the Air Force SBIR|STTR CRP team walks the MDCs through a 15-week process, during which the team helps the MDC provide training on how to find SBIR|STTR efforts during data mining and due diligence activities, and to prepare for their one-on-one sessions. The success of each event rests on the dedication of the MDC performing due diligence to identify if selected technologies meet the MDCs' needs.

A unique characteristic of the TIMs is that they are hosted by the MDC at its facility to increase the opportunity to get the "right people around the table" for the real discussion needed to determine a technology fit. Execution of a Non-Disclosure Agreement is encouraged prior to the meeting to allow for an immediate deep dive of the technology so that all stakeholders are able to leave the room with a strong understanding of the small business's capabilities, the MDC needs, and of next steps.

In 2018, the Air Force SBIR|STTR CRP team assisted five MDCs (Boeing, Harris Corporation, Northrop Grumman (previously Orbital ATK), Raytheon, and Rolls-Royce) and 47 small businesses through the TIM process, facilitating over 46 one-on-one meetings and discussing over 67 SBIR projects. Of these meetings, approximately 61 percent are currently being reviewed for transition potential. Regardless of the outcome of each individual one-on-one, small businesses benefit from the education on how to do business with the MDC, the MDCs benefit from government presentations and Air Force SBIR|STTR CRP contacts, and all form positive relationships.

With the intent of continuing SBIR|STTR education to and with Industry partners, Triumph will be a first-time participant in 2019, along with four repeat participants. The team also anticipates incorporating additional process updates, including assistance with data mining and the option to provide information to create Air Force topics.



The Air Force SBIR|STTR CRP team continues to see the benefit of building relationships with major defense contractors (MDC), encouraging small business participation, and bringing solutions to Air Force warfighters. By leveraging Technology Interchange Meetings (TIM), tailored and unique technology meetings hosted at MDC facilities, these key stakeholders are brought together, integrating small business capabilities with the larger defense industries, assisting small businesses with visibility into new markets, and increasing return on investment opportunities for the Air Force. These are two-day events with MDC leadership briefings, briefings from the Air Force, and one-on-one technology matchmaking meetings.

SBIR | STTR **Topics AND Awardees**

Each year, participating federal agencies identify various R&D topics for pursuit by small businesses under the SBIR | STTR program. Selected topics represent scientific and technical problems requiring innovative solutions. These topics are bundled together into Broad Agency Announcements that are available to interested small businesses at FedBizOpps and the DoD SBIR | STTR websites.

Upon review of the topics, a small business can identify appropriate topics to pursue and offer a proposal on. The BAA letter contains all necessary information for submitting a proposal. Small businesses are encouraged to follow the instructions carefully, as proposals are received, reviewed and evaluated on a competitive basis by Air Force technical experts. These experts select the best proposals, awarding contracts to the most qualified small businesses with the most innovative proposed solutions.



SPECIAL TOPICS AND Partnerships with Tech Accelerators

In FY 2018, The Air Force SBIR | STTR Program deviated from the norm in the interest of delivering critical tools to the warfighter at an accelerated pace.

During the 18.2 Spring Broad Agency Announcement, the Air Force SBIR | STTR Program began to allocate resources toward special topics. These special topics – which differed from the traditional SBIR | STTR topics in multiple ways – were intended to reduce the barriers for small businesses and leverage new methods of doing business. Special topics also allowed the Air Force SBIR | STTR Program to act more as a commercial seed fund.

Among the differences from traditional proposals, the special topics involved:

- An application process that requires a five-page technical paper and a 15-slide “pitch deck,” instead of the traditional 20-page technical proposal;
- Phase I contract awards of varying amounts (\$50K to \$158K) and a three-month period-of-performance, compared to the standard \$150,000 award and nine month period-of-performance;
- Numerous awards for each Phase I, which are typically limited to only a few awards.



“The resounding success of the easy entry and process for the topic with multiple awards that [AFWERX and Air Force SBIR|STTR] has enabled was so helpful that we have asked to do it again [during the 19.2 Broad Agency Announcement]. This has been an awesome model for PEOs that are looking to help close the transition gap between labs and PMOs.”

– Capt Christopher Giacomo
Air Force Life Cycle Management's
Force Protection Division

COMMERCIALIZATION READINESS PROGRAM



For instance:

During the 18.2 BAA, the open innovation topic received 166 proposals resulting in 52 contract awards of \$50K.

During the 18.3 BAA, the open innovation topic received proposals 279 resulting in 84 contract awards of \$50K.

For a few of the topics, small businesses were asked to participate in a government-sponsored, commercially-facilitated technology acceleration process, similar to the pathway for commercial startups, prior to the Phase II process. Additionally, the process introduced a reoccurring open innovation topic looking for dual use technologies that can quickly and cheaply address Department of Defense Challenges.

Air Force SBIR|STTR Special Topics

MANAGING ORGANIZATION	TOPIC	BAA	PROPSALS	SELECTIONS
AFRL	Weather	18.2	27	12
AFRL	PNT Accelerator	18.2	36	8
AFWERX/AFRL	C-UAS	18.2	65	8
AFWERX/AFRL	Logistics	18.2	47	4
AFWERX/AFRL	Open Innovation	18.2	166	52
AFRL	RH Accelerator	18.2	33	8
AFRL/RV	Small Sat Extra Phase Is	18.2	80	5*
MD5	Human-Unmanned Teaming	18.3	43	TBD
MD5	Machine Learning	18.3	81	TBD
MD5	Security of Cyber-Physical Systems	18.3	62	TBD
MD5	Medical Monitoring, Diagnostics and Triage	18.3	50	TBD
AFRL/RQ	AF IP: Hair Sensor	18.3	4	TBD
AFWERX/AFRL	Open Innovation	18.3	279	84
AFWERX/AFRL	Training VR/AR	18.3	104	20

**This was a traditional SBIR that received an overwhelming number of proposals. The Air Force SBIR|STTR program manager for special topics provided them additional awards to determine if there was a positive result from making more awards.*

APPROACHES

The six special topics introduced in the 2018 18.2 BAA were just the first step in a larger pilot effort. During subsequent BAAs, the number of topics grew as the Air Force continued to experiment with ways to drive benefits for both small business and the warfighter.

The special topics are made possible through partnerships with innovative organizations such as AFWERX, the Air Force Research Laboratory, and the Office of the Secretary of Defense's MD5. Other topics include:

- Leveraging MD5's innovation and entrepreneurial programs to pull technologies and intellectual property out of the DoD laboratories and into small business;
- Focusing on ways to rapidly introduce proven commercial technologies at a low cost to improve overall government processes through open innovation calls;
- Ties into the Air Force Technology Transfer mission by funding feasibility studies and planning efforts. Some Phase I winners will be "loaned" Air Force intellectual property in order to build a business case, and some Phase II winners would further develop and prototype technology based on this IP. Successful companies can begin commercial sales by obtaining the proper Air Force license for the IP.

Air Force SBIR | STTR special topics are providing small businesses with increased access to undiluted funding and with the intent of boosting their commercialization rate and driving a higher number of technology transitions to the government at a much faster pace; the speed of innovation.



- **Epic streamlining and simplification of proposal process**
- **Provides Air Force innovation "store fronts" throughout the country**
- **Achieving success metric in 3 months**

AIR FORCE Contracting Sprint

Contracting officials and innovators from across the Air Force, looking to speed up the acquisition process, recently awarded more than 100 contracts in 40 hours to small businesses.

Meeting at the AFWERX Innovation Hub in Austin, Texas, they streamlined contracting processes and developed new ways of doing business to accelerate the transfer of ideas from the lab bench to Airmen to increase lethality and provide a technological advantage to warfighters. AFWERX Austin is the latest addition to the Air Force's Innovation Hub network and provides an "Open to the Public" interface that connects innovators from industry, academia and government to gather for collaboration.

The team was comprised of personnel from Air Education and Training Command, AFWERX, Air Force Installation Contracting Agency, Air Force Research Laboratory, the Air Force Contracting office, Air Force Life Cycle Management Center, Air Force Space Command, Air Force Personnel Center and the Air Force Small Business Innovation Research Program office.

Working through the Small Business Innovation Research Program, or SBIR, the group formed with a goal to significantly trim the amount of time it takes to award contracts to businesses.

In order to streamline the process, which has traditionally taken months to 40 hours, the team worked to auto-generate many of the documents necessary to award a contract by leveraging tools provided by AFWERX since the data from the proposals and from the government evaluations was available in their systems. This process was previously a manual one that could take an individual about an hour to do.

With rapid technological change now the new normal, it can be an advantage to those able to swiftly develop and field solutions to problems. Answers to many complex national security issues will be delivered by harnessing the power of innovators and entrepreneurs within the Air Force, and across the country.



- **Epic streamlining and simplification in Air Force contracting**
- **Solicitation to contract award cut from 180 days to a few days**

AIR FORCE Pitch Day

Planning for the inaugural Air Force Pitch Day began in FY 2018.

The Inaugural Air Force Pitch Day is scheduled to take place in New York City, New York March 6 and 7, 2019. Small businesses will pitch solutions aligned with Air Force Life Cycle Management Center Program Element Offices in response to the 19.1 BAA topics on the following:

- Command, Control, Communications, Intelligence and Network
- Battlefield Air Operations Family of Systems Technologies
- Digital Technologies

More information is available at:

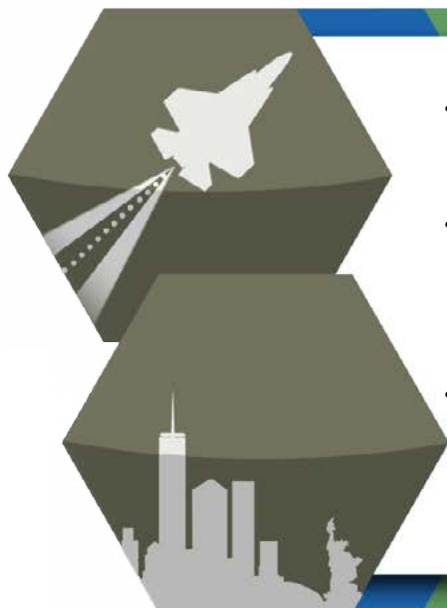
<https://www.afsbirsttr.af.mil/Program/Air-Force-Pitch-Day/>



"Pitch Days are new fast tracks for startups to work with the Air Force. Modeled after commercial investment pitch competitions, our goal is to award \$40 million to startups using one-day, one-page contracts. These awards use convenient credit card payments—we want partnering with the Air Force to be easy and energizing!"

— Dr. Will Roper

Assistant Secretary of the Air Force for Acquisition, Technology and Logistics



- **An open door to sole-source contracts within a \$100+ billion market**
- **Fund matching opportunities, reduced investment risk, and increased impact and success of U.S. technology startups**
- **An easy connection point for prime contractors to try and test technologies against Air Force mission needs**

SBIR | STTR Budgets

Estimate as of 30 September 2018

Annual Air Force SBIR Budget

	BUDGET	TOPICS	SBIR PH I PROPOSALS	SBIR PH I AWARDS	SBIR PH II PROPOSALS	SBIR PH II AWARDS
FY 2015	285,172,000	158	2,031	337	465	493
FY 2016	293,832,500	167	1,910	297	447	167
FY 2017	357,458,934	157	1,926	267	410	209
FY 2018	542,849,828	218	3,534	358	370	224

Annual Air Force STTR Budget

	BUDGET	TOPICS	STTR PH I PROPOSALS	STTR PH I AWARDS	STTR PH II PROPOSALS	STTR PH II AWARDS
FY 2015	39,000,000	29	274	76	56	16
FY 2016	43,928,499	29	196	65	82	48
FY 2017	50,111,066	38	267	56	75	30
FY 2018	81,597,172	37	316	50	77	33

SBIR|STTR Funding by State

STATE	TOTAL \$	STATE	TOTAL \$	STATE	TOTAL \$
AK	\$0	LA	\$750k	OH	\$31.3M
AL	\$6.4M	MA	\$27.4M	OK	\$0
AR	\$750k	MD	\$11M	OR	\$4.8M
AZ	\$9.6M	ME	\$0	PA	\$5.8M
CA	\$46M	MI	\$5.8M	RI	\$150k
CO	\$20.7M	MN	\$2.3M	SC	\$0
CT	\$999k	MO	\$2.2M	SD	\$0
DE	\$900k	MS	\$898k	TN	\$50k
FL	\$11.6M	MT	\$0	TX	\$10.5M
GA	\$1.4M	NC	\$4.8M	UT	\$7.1M
HI	\$400k	ND	\$0	VA	\$16.5M
IA	\$900k	NE	\$0	VT	\$150K
ID	\$150k	NH	\$1.7M	WA	\$2M
IL	\$2M	NJ	\$4.1M	WI	\$1M
IN	\$1.5M	NM	\$8.1M	WV	\$750k
KS	\$0	NV	\$0	WY	\$1.4M
KY	\$1M	NY	\$9.4M	DC	\$50k
				PR	\$0

SBIR 2018.1 Topics

The following Air Force topics were released during the SBIR 2018.1 BAA.

TOPIC NUMBER	TOPIC TITLE
AF181-001	Integration of Optical and Radio Frequency (RF) Softwares into End-to-End Analysis Framework
AF181-002	Nanosecond Electrical Pulser
AF181-003	Biodynamic Acceleration and Angular Response During Fixed Wing Aircraft Ejection
AF181-004	Superconducting THz Sources and Receivers
AF181-005	Effects of Sustained Vibration and High Temperature Environments on Polymer Bonded Composite Materials
AF181-006	Chip-scale Inertial Measurement System
AF181-007	Missile Motor Cutting Technology
AF181-008	Externally Mounted Wide-range Saturated Steam Flow Meter
AF181-009	Automated ICBM Wall Thickness Measurements
AF181-010	Quick and Reliable Hydrogen Embrittlement Testing
AF181-011	Chilled Brine Separation
AF181-012	Free Flight Hypersonic Erosion and Ablation Measurement System
AF181-013	Extremely Small Balance Technology
AF181-014	Wave Isolation
AF181-015	Computational Geometry Kernel Support
AF181-016	Virtual Reality for Test Cell Presence
AF181-017	DE Optical Turbulence Collection Sensor
AF181-018	Rechargeable Thermal Batteries for Airborne Systems
AF181-019	Novel Battle Damage Assessment Using Sensor Networks
AF181-020	Rapid Construction of 3-D Satellite Models from Limited Amounts of 2-D Imagery
AF181-021	Algorithms and Networking Protocols for Secure, Wireless High-frequency Communications Systems
AF181-022	High-Frequency Ionospheric Visualization Environment (High-FIVE)
AF181-023	Optimized Personal Area Network (PAN) for Battlefield Airmen
AF181-024	Robust, Adaptive Machine Learning (RAM)
AF181-025	Evidence-based Certification Analysis and Planning in Acquisition
AF181-026	Novel Concepts for Combustion Instability Reduction
AF181-027	Real Time Thermal Imaging Capability for Propulsion Systems
AF181-028	Improved Turbochargers for Small IC Engines
AF181-029	Intelligent Robust Controller for Hybrid Electric UAVs
AF181-030	Novel Engine Cycles for Booster Stage Liquid Rocket Engines
AF181-031	Interpropellant Shaft Seal Solutions for Advanced Upper Stage Propulsion Systems
AF181-032	Direct Injection Systems for Small UAV Engines

TOPIC NUMBER	TOPIC TITLE
AF181-033	Innovative Turbine Engine Propulsion Solutions for Class 3 Unmanned Aerial Vehicles
AF181-034	Advanced Material/Sealing Concepts for Small Heavy-Fuel, Remotely Piloted Aircraft (RPA's) Propulsion Systems
AF181-035	High Durability, Light Weight Bearings for Small Turbine Engines
AF181-036	Propellant Management Device for Monopropellant
AF181-037	Innovative Interconnectivity and Scheduling of Smart Sensors and Actuators for Reliable Propulsion Systems Controls
AF181-038	Predictive Missile Sustainment and Reliability Capability
AF181-039	EGS Architecture Support and Data Integration for Enhanced SSA
AF181-040	High Performance Radiation Hardened Solar Power
AF181-041	Next Generation Satellite Transponder using Low-Cost Adaptive HPA Linearization Technologies
AF181-042	Microstructural Treatment of Munitions Cases to Improve Performance
AF181-043	Innovative Solutions for Multi-Rotor Flight Endurance
AF181-044	Fluid Resistant, Electrically Resistive Foam
AF181-045	Corrosion Nondestructive Evaluation (NDE) in Confined Access Areas
AF181-046	Safe, Large-Format Lithium-ion (Li-ion) Batteries for ICBMs
AF181-047	Nondestructive Evaluation (NDE)-based Condition Assessment of Sub-surface Concrete with Limited Access
AF181-048	Structural Nuclear Effect Mitigation of Composite Aeroshells for Munitions for Air Platforms and Cruise Missile Systems
AF181-049	Interface Inspection Method for Thermal Spray Coatings
AF181-050	Assisted Data Analysis for Portable Nondestructive Inspection
AF181-051	Efficient 3-D Finite Element Process Modeling to Enable Linear Friction Welding of Aerospace Components
AF181-052	Efficient Evaluation of Fiber Coatings
AF181-053	Compact UHF/VHF Antenna
AF181-054	Advanced Machining of Aerospace Materials
AF181-055	Broadband Fibers Optic Components for DoD Applications
AF181-056	Flight line Portable Fuel Purifier
AF181-057	Rapid Manufacturing of Tooling for On-Aircraft Composite Scarf Repairs
AF181-058	Rapid, Low-cost Material Qualification for High-Cycle Durability of Blades in Short-Life Turbine Engines
AF181-059	Low Temperature Copper Inks for Low-cost Flexible Hybrid Electronics Manufacturing
AF181-060	Analytical Tool for Assessing Short Fiber Composite Structural Behavior
AF181-061	Robust, Light-Weight Bistatic Weather Radar
AF181-062	Building Die Extracted/Repackaged (DER)-Optical Hybrid Integrated Circuits (ICs) to Replace Passive Devices and Obsolete Packaged ICs in a Line Replaceable Unit (LRU) to Enhance Performance, Reliability, and Service Life
AF181-063	Adaptable Interfaces for M&S Tools
AF181-064	Singular Optics Communications Method for Disadvantaged Users

STTR 2018.A Topics

As with the SBIR topics, each year, participating federal agencies identify various R&D topics for pursuit by small businesses with research institution partners under the STTR program. Selected topics represent scientific and technical problems requiring innovation solutions.

These topics are bundled together into BAAs that are distributed to interested small businesses and FedBizOpps and the DoD SBIR | STTR websites.

The following Air Force topics were released during the STTR 2018.A BAA.

TOPIC NUMBER	TOPIC TITLE
AF18A-T001	Detection of Radio Frequency and Magnetic Field Bioeffects in Living Cells
AF18A-T002	Autonomous Self-Calibration of Sensing Systems and Instrumentation
AF18A-T003	Integrated Ultra-High Performance Electro-Optic Modulators
AF18A-T004	Multi-Physics Models for Parachute Deployment and Braking
AF18A-T005	Metasurface Photonics
AF18A-T006	Volumetric Wavefront Sensing for the Characterization of Distributed-Volume Aberrations
AF18A-T007	Full Mueller Matrix Characterization of Imaged Samples Using Digital Holography
AF18A-T008	Stable High Bandwidth AO Control with Physical DM Constraints
AF18A-T009	Modern Manufacturing for Liquid Rocket Engine Components
AF18A-T010	Reconfigurable / Cognitive Optical Communications
AF18A-T011	Passive Cathode Device for Space Plasma Applications
AF18A-T012	Damage Morphology for Advanced Concretes
AF18A-T013	High Temperature Materials for Hypersonic Radomes and Antennas
AF18A-T014	Application of Hierarchical Memory Models to Automatic Target Recognition Modeling and Simulation
AF18A-T015	Radio Frequency (RF) Filter Tuning Element
AF18A-T016	High Damage Threshold Antireflective Treatment for Infrared Nonlinear Materials
AF18A-T017	Next Generation Infrared Scene Projector for Testing MWIR Systems

SBIR 2018.2 Topics

The following Air Force topics were released during the SBIR 2018.2 BAA.

TOPIC NUMBER	TOPIC TITLE
AF182-001	Commercial Solutions for Weather Forecasting
AF182-002	Innovative Position Navigation and Timing
AF182-003	Future Counter UAS Technology Options
AF182-004	Future Logistics and Supply Chain Options
AF182-005	Open Call for Innovative Defense-Related Dual-Purpose Technologies/Solutions
AF182-006	Human-Machine Teaming in Data Processing, Exploitation, and Dissemination -- A Technology Accelerator
AF182-007	Field of Light Display for Air, Space, and Cyber Battle Management
AF182-010	Selectable Cutting and Fragmentation of Damaged Runway Surfaces
AF182-011	AFFF Replacement
AF182-012	Autonomous Measurement and Reporting of Fluorocarbons in Groundwater
AF182-013	Aircraft Brake Titanium Torque Tube Heat Damage Nondestructive Inspection
AF182-014	Non-Destructive Testing for Landing Gear Applications
AF182-015	Resilient Design and Operation of Complex Manufacturing
AF182-016	Predictive Analytics for Optimal Repair Determination
AF182-017	Integrated Scan to Print 3-D Modeling System
AF182-018	Additive Manufacturing Capability for Advanced, Embedded Temperature and Heat Flux Sensors
AF182-019	Machine Learning Applied to Measurement Assessment
AF182-020	Nonintrusive Airflow Measurement System
AF182-021	3D Additive Manufacturing Hybrid-Material Tiles
AF182-022	High-Response Pressure Transducers for Hypersonic Vehicle Testing
AF182-023	External Drum Dynamometer Runway Texture Coating
AF182-024	Time-Resolved, 3D, Non-Destructive Imaging for Solid Rocket Motors
AF182-025	Egress Manikin TSPI and Orientation System
AF182-026	Aeroelastic Vulnerability Assessment
AF182-027	Stable, Programmable, Solid State Solar Simulator for Long Duration Testing
AF182-028	Parallel GPU Processing for Large Scale State Filters
AF182-029	Scientific Data Server
AF182-030	Airborne Infrared Signature/Atmospheric Measurement System
AF182-031	Highly Targeted Non-toxic Predator Aversion Training Devices
AF182-032	Millimeter-Wave Video Synthetic Aperture Radar (MMW Vid-SAR)
AF182-033	Directed Energy Decision Aids

TOPIC NUMBER	TOPIC TITLE
AF182-034	Materials for Improved Vacuum Performance in High Power Electromagnetic (HPEM) Source Devices
AF182-035	Carbon Nanotube Fiber Cathode for High Power Electromagnetics Applications
AF182-036	Integrating Sphere at Microwave Frequencies
AF182-037	Correlation and Data Processing Algorithms for Stereo Viewing with Optical Sensors
AF182-038	Analysis and Prediction of FSO Coverage within the Battlespace (FSO-PLAN)
AF182-039	Detection and Intercept of FSO Interplane Communications Using Long-distance Transmission (DIFICULT)
AF182-040	Referential Positioning of non Selective Availability Anti-Spoofing Module (SSSM) capable Tactical Radios (RePTAC)
AF182-041	Militarized Direct RF Conversion Software Defined Radio (SDR)
AF182-042	Secure, Wireless High-frequency Communications Network Architecture for Point-to-point Surface Communications
AF182-043	Hypotheses Management for Event Prediction
AF182-044	Mission Information Resilience and Provisioning
AF182-045	Human-Centered Workflows for Interacting with Automated Processing Systems
AF182-046	Software Tool for Cryptographic Algorithms on FPGA
AF182-047	Powered Rollers for Cargo Aircraft
AF182-048	Automated Pallet Planning Tools
AF182-049	Modular Approach to Adding Cooling Capacity
AF182-050	Improved Cargo Pallet Restraint System
AF182-051	Ballistic-Resistant, Wearable Battery Based on Shear Thickening Electrolyte
AF182-052	Diminishing Manufacturing Source (DMS) Acquisition and Sustainment Tool
AF182-053	Mask-Free Thermal Spray Module
AF182-054	Lithium-ion (Li-ion) Battery Thermal Runaway Propagation and Containment Solutions
AF182-055	Fast Activating Lithium or Lithium-ion (Li-ion) Reserve Battery
AF182-056	Multi-Phase Fuel Injection Modeling for Scramjet Applications
AF182-057	Surrogate Model for Jitter Estimation in Preliminary Design of Optical Turret Installations
AF182-058	Technology Enhancement for Small Recuperated Turboalternator: Thrust Management Approaches
AF182-059	Advanced Materials and Coatings for Unmanned Aerial System (UAS) Propulsion
AF182-060	Novel Engine Cycles for Upper Stage Liquid Rocket Engines
AF182-061	Reliable High Performance Microcontroller for Extreme Temperatures
AF182-062	Analysis Tool to Predict the Behavior of Bolted Composite/Metallic Hybrid Joints with Many Fasteners
AF182-063	Rotating Detonation Engine for Rocket Propulsion
AF182-064	Pressure-Gain Combustion Turbopump Drive System
AF182-065	Life Time Improvements for Electric Thruster Technologies
AF182-066	Next Generation Small Satellite Technologies
AF182-067	Accurate Time Transfers in Crosslink / Communications Networks
AF182-068	Midwave/Longwave Infrared Detector with Electronically-Tunable Narrowband Spectral Response
AF182-069	Solar Cell Bypass and String Blocking Diode Development
AF182-070	A Standard Stand-Alone Space Environment Workbench

TOPIC NUMBER	TOPIC TITLE
AF182-071	Sensor to Establish the Initial Orbit of Deployed Satellites
AF182-072	Inertial Measurement Unit (IMU) Navigation for Spacecraft, in Order to Augment GPS Position and Navigation
AF182-073	Processes for Qualification of Additively Manufactured Launch and Space Vehicle Components
AF182-074	Standardized Scalable Components and Structures for ESPA Class and Below
AF182-075	OPIR Radiometric Calibration
AF182-076	Non-traditional Sensor Data Confidence
AF182-077	Legacy Embedded Weapon System Cyber Microvisor
AF182-078	Adapting UAV/UAS Cyber Security Algorithms to Small Satellites
AF182-079	Integrating Performance Enhanced Proxies with Bundle Protocols Over High Assurance Internet Protocol Encryptions
AF182-080	Standardized Manipulator Fixture for Small Satellites (1112)
AF182-081	Smart On-Board Satellite AGC Loop with Anti-jamming Capability for Spread Spectrum Frequency Hopping Systems
AF182-082	Simple and Lightweight On-Orbit Servicing Components
AF182-083	Spacecraft Dead Bus Recovery (Li-ion Based)
AF182-084	Microstructurally-Based Constitutive Models for Composite Energetic Materials
AF182-085	Real-time Single Chip Target Acquisition and Tracking for sUAV Gimbal
AF182-086	Integrating the ALE3D Hydrocode with MEVA and Endgame Framework
AF182-087	High Lethality, Smaller Form Factor Ordnance Package
AF182-088	High Operating Temperature (HOT) Mid-Wave Infrared (MWIR) Detectors for IR Seekers
AF182-089	Evolutionary Design Optimization for Guided Weapon Concepts Modeling and Simulation
AF182-090	Digital Processing Inspection Verification for the Production Environment
AF182-091	Remote Monitoring of Sensors during Composite Curing
AF182-092	Galvanic Modeling Trade Tool for Current/Future Tankers
AF182-093	Increasing the Flexibility and Performance of Laser Bond Inspection System Delivery
AF182-094	Affordable, Durable, Electrically Conductive Coating or Material Solution for Silver Paint Replacement on Advanced Aircraft
AF182-095	Hardening Technologies for Air Platforms and Cruise Missile Systems
AF182-096	Develop Capability to Measure the Health of High Impedance Resistive Materials
AF182-097	Carbon-Carbon Manufacturing Process Modeling
AF182-098	Modeling Tools for the Drilling of Polymer Matrix Composites (PMCs)
AF182-099	Low Cost, Agile Methods for Tooling for Manufacturing Composite Parts
AF182-100	Coupled Infusion-Cure Modeling Simulation for Low-Cost Composite Parts for Process Defects and Geometric Conformity
AF182-101	Airborne Optical System (Flying Telescope)
AF182-102	Tools to Enable Systematic Testing of Avionics Cyber Security
AF182-103	Extended Weather Measurements in Support of Remotely Piloted Aircraft
AF182-104	In-Flight Rapid Cyber Diagnostics and Response for Mission Assurance
AF182-105	Photonic Quantizer for Use in Photonic Analog to Digital Converters (pADCs)
AF182-106	High Dynamic Range (HDR) Improvements for Synthetic Aperture Radar (SAR)/Ground Moving Target Indicator (GMTI) and Passive/Bistatic Radar
AF182-107	Develop Small Pitch ROIC Multifunction LADAR Receiver

TOPIC NUMBER	TOPIC TITLE
AF182-108	Compact High Channel Count High Speed Digitizing, Processing, and Storage System for Synthetic Aperture Ladar (SAL) and Synthetic Aperture Radar (SAR)
AF182-109	Conformal Aperture Non-Mechanical Beam Steering (NMBS) for Attritable Platform
AF182-110	Target ID and Radar Backtracking of Anti-Aircraft Projectiles
AF182-111	V-Band Solid-State Power Amplifiers for SATCOM Downlinks
AF182-112	Advanced Receiver Autonomous Integrity Monitoring (ARAIM) Algorithm Development, Demonstration, and Signal Trust Considerations
AF182-113	Quad Band GNSS Antenna Electronics for Controlled Reception Pattern Antenna System
AF182-114	Low-SWaP-C Antenna Electronics for GPS L1/L2/L5 Controlled Radiation Pattern Antenna System
AF182-115	Extremely Low Cost Sensors for Small Spacecraft

STTR 2018.B Topics

The following Air Force topics were released during the STTR 2018.B BAA.

TOPIC NUMBER	TOPIC TITLE
AF18B-T001	A Software Toolkit for Predicting the Neural Signatures of Cognitive States.
AF18B-T002	Self-Learned Agents for Collective Analysis of Human Activities and Events in Aerial Videos
AF18B-T003	Electronically Dimmable Eye Protection Devices (EDEPD)
AF18B-T004	Efficient and Faster Methods for Performing General Wave-Optics Propagation
AF18B-T005	Attenuation Tracking for Frequencies from 3 kHz to 60 GHz
AF18B-T006	Carbon Nanotube FET Modeling and RF Circuits
AF18B-T007	Contour Based Image Segmentation
AF18B-T008	Clearance of Aircraft Stores Carriage under Uncertainty
AF18B-T009	Small UAS Compatible Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensors
AF18B-T010	Multiphysics Modeling of Dynamic Combustion Processes
AF18B-T011	Optical Joining for Resilient Space Photovoltaic Integration
AF18B-T012	EGS Data Source Integration for Enhanced SSA
AF18B-T013	Adiabatic/Reversible Logic Test Chip
AF18B-T014	X-ray Cinematography for Explosive Events
AF18B-T015	Mid-IR Laser Based on Gas or Liquid Filled Hollow-Core Photonic Crystal Fibers
AF18B-T016	Rapid Nondestructive Inspection of Traditionally Uninspectable Adhesively-Filled Composite Joints
AF18B-T017	Development of Quasi-2D "MXene" Ceramic Fillers for Electromagnetically Responsive Composites

SBIR 2018.3 Topics

The following Air Force topics were released during the SBIR 2018.3 BAA.

TOPIC NUMBER	TOPIC TITLE
AF183-001	Manned-Unmanned Teaming SBIR View
AF183-002	Machine Learning for Defense Applications SBIR View
AF183-003	Cyber Security of Physical Systems SBIR View
AF183-004	Medical Monitoring, Diagnostics, and Triage SBIR View
AF183-005	Open Call for Innovative Defense-Related Dual-Purpose Technologies/Solutions with a Clear Stakeholder Need SBIR View
AF183-006	Innovative Training Solutions (e.g. AR, VR, MR) SBIR View
AF183-008	Integration of Onboard Distributed Flow Sensing Using AF Intellectual Property US9658087B1 SBIR View
AF183-010	Personal Display That Eliminates Visual Eavesdropping SBIR View
AF183-011	Characterization of Broadcast and Social Media for Indications and Warnings SBIR View
AF183-012	Wide Area Monitoring and Alerting: Visualization for Real Time ISR Sensemaking and Situational Awareness SBIR View
AF183-013	Secure Cockpit-to-Ground Wireless Data Transfer SBIR View
AF183-014	Capping Material for Compacted Runway Crater Repairs SBIR View
AF183-015	Lightweight Replacement for AM-2 Runway Matting SBIR View
AF183-016	An Alternate Corrosion Resistant Coating to be Applied to Aluminum and Magnesium Secondary Power System Parts SBIR View
AF183-017	An Alternate Corrosion Resistant Coating to be Applied to Aluminum Secondary Power System Parts SBIR View
AF183-018	An Alternate Corrosion Resistant Coating to be Applied to Magnesium Secondary Power System Parts SBIR View
AF183-019	Technology to Assist with Lifting, Moving and Holding 0 to 40 Pounds SBIR View
AF183-020	Technology to Assist with Lifting, Moving and Holding 0 to 300 Pounds SBIR View
AF183-021	X-Ray Tomography SBIR View
AF183-022	Microbiological Contamination Detection Sensor for Fuel Storage Tanks SBIR View
AF183-023	Thermal Characteristics of Ferrite Phase Shifters SBIR View
AF183-024	Missile Attitude Measurement System SBIR View
AF183-025	A Semi-autonomous Field Survey Device SBIR View
AF183-026	Ultra Low Outgassing, Focusing, and Hard Seal Capable Materials for HPM Radomes SBIR View
AF183-027	Manually-Actuated Laser Intersite Communications Equipment (MALICE) SBIR View
AF183-028	Missile Plume Analysis and Modeling for Generation of Missile Profiles Used in Missile Warning SBIR View
AF183-029	Code Division Multiple Access (CDMA) Radio Development for Small Satellites SBIR View

TOPIC NUMBER	TOPIC TITLE
AF183-030	Next-Generation Forecasting Model of Global Equatorial Scintillation SBIR View
AF183-031	Enabling Peel-and-Stick Conformal Antennas for SUAS SBIR View
AF183-032	Identifying and Remedying Multiple Trace Contaminants in Manufacturing Environment to Prevent Bond Failure SBIR View
AF183-033	Power Electronics Thermal Interfaces (PETI) SBIR View
AF183-034	Design Framework for Optimized Multifunctional Coatings SBIR View
AF183-035	Nondestructive Inspection/Evaluation (NDI/E) Probe and Aircraft Structure Coordinate Mapping SBIR View
AF183-036	Automated Precision Coating Removal SBIR View
AF183-037	Structured Light for Coating Application and Removal SBIR View
AF183-038	Experimental Methods for Predicting Material Interactions with Plasmas SBIR View
AF183-039	Affordable Materials and Coatings for Pressure Gain Combustion SBIR View
AF183-040	Automated Whole Body OML (Outer Mold Line) Defect Assessment SBIR View
AF183-041	Nondestructive Evaluation of Composite Substrate Below Thick Top Coat Materials SBIR View
AF183-042	Field-Level Transparency Inspection System SBIR View
AF183-043	Standalone Non-Invasive Sensing of Cyber Intrusions in FADEC for Critical Aircraft System Protection SBIR

STTR 2018.C Topics

The following Air Force topics were released during the STTR 2018.C BAA.

TOPIC NUMBER	TOPIC TITLE
AF18C-T001	Development of a Real-time Biomarker Sensor for the Assessment of High Threat Events During Battlefield Airmen Training and Operations
AF18C-T002	Cyber Knowledge Management for Weapon Systems
AF18C-T003	Ultra Wideband Receiver (UWR) – Sample Clock Modulation

FY 2018 Topic Award Selectees

Small businesses selected for Air Force SBIR|STTR award in FY 2018.

FIRM	CITY	ST
(ES3) Engineering and Software System Solution, Inc.	San Diego	CA
(METSS) Materials Engineering And Technical Support Services Corp.	Westerville	OH
3D Aerial Solutions LLC	Dayton	OH
5ME LLC	Cincinnati	OH
Accel-RF Corporation	San Diego	CA
Acellent Technologies, Inc.	Sunnyvale	CA
ACENT Laboratories LLC	Bohemia	NY
Acree Technologies, Inc.	Concord	CA
Ada Technologies, Inc.	Littleton	CO
Adelphi Technology, Inc.	Redwood City	CA
Adirondack Analytics	Ava	NY
AdValue Photonics, Inc.	Tucson	AZ
Advanced Ceramics Manufacturing	Tucson	AZ
Advanced Computational Technology LLC	Champaign	IL
Advanced Cooling Technologies, Inc.	Lancaster	PA
Advanced Optical Technologies, Inc.	Albuquerque	NM
Advanced Powder Solutions, Inc.	Cypress	TX
Advanced Research Corp.	White Bear Lake	MN
Agile Rf Systems LLC	Berthoud	CO
Ahmic Aerospace LLC	Beavercreek	OH
Alden Research Laboratory, Inc.	Holden	MA
Alphacore, Inc.	Tempe	AZ
American Technical Coatings, Inc.	Westlake	OH
APES, Inc.	St. Louis	MO
Apogee Scientific, Inc.	Highlands Ranch	CO
Applied Defense Solutions, Inc.	Columbia	MD
Applied Optimization, Inc.	Fairborn	OH
Applied Sciences, Inc.	Cedarville	OH
Applied Signals Intelligence	Reston	VA



The following small businesses were selected for Phase I, II or III contracts during FY 2018 (Note: This list may not be complete). The awards' associated topics could have come from several solicitations, however, a selection for an award does not guarantee the business won the final contract (other issues may come into play, such as meeting accounting standards, that might prevent a selectee from receiving the final contract).

Small businesses selected for Air Force SBIR|STTR award in FY2018. *(continued)*

FIRM	CITY	ST
Applied Thin Films, Inc.	Skokie	IL
Aptima, Inc.	Woburn	MA
Archiemd, Inc.	Boca Raton	FL
Architecture Technology Corp.	Eden Prairie	MN
Arizona Engineering Science LLC	Tucson	AZ
Assurance Technology Corp.	Carlisle	MA
Assured Information Security, Inc.	Rome	NY
Astrapi Corp.	Dallas	TX
ATA Engineering, Inc.	San Diego	CA
ATC - NY	Trumansburg	NY
A-TECH Corp.	Albuquerque	NM
Atmospheric and Space Technology Research Associates	Boulder	CO
Atolloa Engineering	Camarillo	CA
ATS-MER LLC	Tucson	AZ
Attollo Engineering LLC	Camarillo	CA
Augmnt, Inc.	Nevada City	CA
Aura Technologies LLC	Raleigh	NC
Autonomous Solutions, Inc.	Petersboro	UT
AVID LLC	Yorktown	VA
AVL Technologies	Asheville	NC
Baker Engineering, Inc.	Nunica	MI
Bascom Hunter Technologies	Baton Rouge	LA
Basic Commerce and Industries, Inc.	Moorestown	NJ
Belmont Scientific, Inc.	Belmont	MA
Binery Scientific	Atlanta	GA
Black Diamond advanced Technology LLC	Chandler	AZ
Black River Systems Company, Inc.	Utica	NY
BlazeTech Corp.	Woburn	MA
Blue Canyon Technologies, Inc.	Boulder	CO
Blue Cranium LLC D/B/A Comsat Architects	Rocky River	OH
Bluestaq LLC	Colorado Springs	CO
Bokam Engineering, Inc.	Santa Ana	CA
Boron Specialties LLC	Ambridge	PA
Boulder Nonlinear Systems, Inc.	Lafayette	CO
Brandywine Photonics LLC	Exton	PA
Braxton Technologies LLC	Colorado Springs	CO

FIRM	CITY	ST
Busek Co., Inc.	Natick	MA
Ceramics Composites and Coatings Inc.	Lancaster	PA
CFD Research Corp.	Huntsville	AL
Charles River Analytics, Inc.	Cambridge	MA
Chip Design Systems LLC	Hockessin	DE
Chiral Photonics, Inc.	Pine Brook	NJ
Clear Aspect Solutions LLC	Sacramento	CA
CMSoft, Inc.	Palo Alto	CA
Coherent Technical Services, Inc.	Lexington Park	MD
ColdQuanta, Inc.	Boulder	CO
Compass Technology Group LLC	Alpharetta	GA
Concepts NREC LLC	White River Junction	VT
Concepts to Systems, Inc.	Danville	VA
Conductive Composites Company	Heber City	UT
Continental Controls and Design, Inc.	Huntington Beach	CA
Convergent Manufacturing Technologies US	Seattle	WA
Cornerstone Research Group	Miamisburg	OH
Cornerstone Software Solutions, Inc.	Orlando	FL
Corrosion Prognostics LLC	Leesburg	VA
Corvid Technologies LLC	Mooresville	NC
Cosmic Advanced Engineered Solutions, Inc.	Colorado Springs	CO
CoVar Applied Technologies, Inc.	McLean	VA
Creare LLC	Hanover	NH
Cubic Aerospace LLC	Reston	VA
Custom Manufacturing & Engineering, Inc.	Pinellas Park	FL
Cybernet Systems Corp.	Ann Arbor	MI
CyberWinter Studios LLC	Louisville	CO
Data Fusion and Neural Networks LLC	Arvada	CO
Decisive Analytics Corp.	Arlington	VA
Defense Engineering Corp.	Beavercreek	OH
Design Interactive, Inc.	Orlando	FL
DHPC Technologies, Inc.	Woodbridge	NJ
DIGIBEAM	San Juan Capistrano	CA
Digital Optics Technologies, Inc.	Rolling Meadows	IL
Diversified Technical Systems, Inc.	Seal Beach	CA

Small businesses selected for Air Force SBIR|STTR award in FY2018. *(continued)*

FIRM	CITY	ST
Diversified Technologies, Inc.	Bedford	MA
DSPLOGIC, Inc.	Germantown	MD
DYNAFLOW, Inc.	Jessup	MD
Dynamic Systems and Research	Albuquerque	NM
DZYNE Technologies, Inc.	Fairfax	VA
Eccrine Systems, Inc.	Cincinnati	OH
Echo Ridge LLC	Sterling	VA
EDaptive Computing, Inc.	Dayton	OH
Edward Pope Dr DbA Matech	Westlake Village	CA
Electro Standards Laboratories	Cranston	RI
Electromagnetic Systems, Inc.	El Segundo	CA
Emergent Space Technologies, Inc.	Laurel	MD
En Urga Inc.	West Lafayette	IN
Energid Technologies	Cambridge	MA
Engine Research Associates, Inc.	Laguna Hills	CA
Engineering Research and Analysis Company	Dayton	OH
ENGIN-IC, Inc.	Plano	TX
EpiSys Science, Inc.	Poway	CA
Epitaxial Laboratory, Inc.	Dix Hills	NY
esc Aerospace US LLC	Orlando	FL
Eskra Technical Products, Inc.	Saukville	WI
eSpin Technologies, Inc.	Chattanooga	TN
Etegent Technologies, LTD	Cincinnati	OH
Exo-Atmospheric Technologies	Oconomowoc	WI
FBS, Inc.	Bellefonte	PA
Federal Foundry	Arlington	VA
FIBERTEK, Inc.	Herndon	VA
Figure, Inc. D/B/A Figure Engineering	Lorton	VA
Fiore Industries, Inc.	Albuquerque	NM
Firefly Photonics LLC	Solon	IA
First RF Corp.	Boulder	CO
Flexsurface, Inc.	Vestal	NY
Flight Works, Inc.	Irvine	CA
Florida Turbine Technologies, Inc.	Jupiter	FL
Foundry Defense Systems, Inc.	Boise	ID
Fracturelab LLC	Fruit Heights	UT
Freedom Photonics LLC	Santa Barbara	CA
Frontier Technology, Inc.	Goleta	CA

FIRM	CITY	ST
FTL Labs Corp.	Amherst	MA
Fuse Integration, Inc.	San Diego	CA
Galois, Inc.	Portland	OR
Galorath, Inc.	El Segundo	CA
Gastops, Inc.	Huntsville	AL
General Nano LLC	Cincinnati	OH
Geneva Technologies	Monument	CO
GenXComm, Inc.	Austin	TX
GEOST, Inc.	Tucson	AZ
GHKN Engineering LLC	Kirkland	WA
Global Circuit Innovations, Inc.	Colorado Springs	CO
GoHypersonic, Inc.	Dayton	OH
Goodman Technologies LLC	Albuquerque	NM
Gordon Aerospace and Defence	Colorado Springs	CO
Graf Research Corp.	Blacksburg	VA
GrammaTech, Inc.	Ithaca	NY
Green Revolution	Austin	TX
Grid Logic, Inc.	Auburn Hills	MI
GS Engineering, Inc.	Houghton	MI
Guardion, Inc.	Boston	MA
Guidestar Optical Systems, Inc.	Longmont	CO
HAMR Industries LLC	State College	PA
Hart Scientific Consulting International LLC	Tucson	AZ
Helicon Chemical Company LLC	Orlando	FL
Helios Remote Sensing Systems, Inc.	Rome	NY
Hepburn and Sons LLC	Manassas	VA
High Performance Imaging LLC	West Lafayette	IN
Hill Engineering LLC	Rancho Cordova	CA
HNu Photonics	Kahului	HI
Human Systems Integration	Walpole	MA
HyPerComp, Inc.	Westlake Village	CA
Hyperion Technology Group, Inc.	Tupelo	MS
HYPRES, Inc.	Elmsford	NY
IDEAS Engineering and Technology	Albuquerque	NM
ImSAR LLC	Springville	UT
IN Space LLC	West Lafayette	IN
Indiana Microelectronics LLC	West Lafayette	IN
Inductive Ventures LLC	Marietta	GA

Small businesses selected for Air Force SBIR|STTR award in FY2018. *(continued)*

FIRM	CITY	ST
InfoBeyond Technology LLC	Louisville	KY
Information Systems Laboratories, Inc.	San Diego	CA
InnoSys	Salt Lake City	UT
Innovative Scientific Solutions, Inc.	Dayton	OH
iNovex Information Systems	Hanover	MD
InspiRD, Inc.	Mission Viejo	CA
Integrated Test Solutions	East Longmeadow	MA
Intelligent Automation, Inc.	Rockville	MD
Intelligent Fiber Optic Systems Corp.	Santa Clara	CA
Intelligent Fusion Technology, Inc.	Germantown	MD
Intelligent Optical Systems, Inc.	Torrance	CA
Intellisense Systems, Inc.	Torrance	CA
International Electronic Machines	Troy	NY
IRFLex Corp.	Danville	VA
J. T. McGraw and Associates LLC	Placitas	NM
Janicki Bioenergy LLC	Mount Vernon	WA
JENTEK Sensors, Inc.	Waltham	MA
Judd Strategic Technologies LLC	Rockwall	TX
Jung Research and Development Corp.	Bethesda	MD
Karagozian and Case, Inc.	Glendale	CA
KCF Technologies, Inc.	State College	PA
KickView Corp.	Centennial	CO
Kitware	Clifton Park	NY
Knowledge Based Systems, Inc.	College Station	TX
Kord Technologies, Inc.	Huntsville	AL
Kyma Technologies, Inc.	Raleigh	NC
Land Sea Air Autonomy	Westminster	MD
Level 6 Engineering LLC	West Lafayette	IN
Lickenbrock Technologies, Inc.	St. Louis	MO
Liquid Carbonic LLC	Columbia	MO
LMGH	Lake Forest	CA
Loadpath LLC	Albuquerque	NM
Louthan Engineering	Baltimore	MD
Luna Innovations, Inc.	Roanoke	VA
Lunar Outpost, Inc.	Boulder	CO
Lynntech, Inc.	College Station	TX
M4 Engineering, Inc.	Long Beach	CA
Mainstream Engineering Corp.	Rockledge	FL

FIRM	CITY	ST
Makai Ocean Engineering, Inc.	Kailua	HI
Makel Engineering, Inc.	Chico	CA
Management Sciences, Inc.	Albuquerque	NM
Match Grade, Inc.	Denver	CO
Materials Research and Design	Wayne	PA
Materials Sciences Corp.	Horsham	PA
Materials Technologies Corp.	Monroe	CT
Matrix Research, Inc.	Dayton	OH
Maxentric Technologies LLC	Fort Lee	NJ
Max-IR Labs	Plano	TX
Maxset Worldwide, Inc.	Burien	WA
McQ, Inc.	Fredericksburg	VA
Mentis Technologies LLC	Syracuse	NY
Metalenz, Inc.	Weston	MA
MetroLaser, Inc.	Laguna Hills	CA
Metron, Inc.	Reston	VA
METSS Corp.	Westerville	OH
MicroLink Devices	Niles	IL
Millennium Space Systems, Inc.	El Segundo	CA
Mimyr, LLC	Rancho Palos Verdes	CA
Mitek Analytics LLC	Palo Alto	CA
MMA Design LLC	Loveland	CO
Mobile Virtual Player LLC	Lebanon	NH
Modus Operandi, Inc.	Melbourne	FL
Mohawk Innovative Technology, Inc.	Albany	NY
MolyWorks Materials Corp.	Los Gatos	CA
MRL Materials Resources LLC	Dayton	OH
MZA Associates Corp.	Albuquerque	NM
NanoAI LLC	Skokie	IL
Nanohmics, Inc.	Austin	TX
NanoSonic, Inc.	Pembroke	VA
Neva Ridge Technologies, Inc.	Boulder	CO
Nextgen Composites LLC	Stuart	FL
NextGen Federal Systems LLC	Morgantown	WV
NOHM Technologies	Rochester	NY
Nokomis, Inc.	Charleroi	PA
Norcon Technologies LLC	Tucson	AZ
NorthWest Research Associates, Inc.	Bellevue	WA

Small businesses selected for Air Force SBIR|STTR award in FY 2018. *(continued)*

FIRM	CITY	ST
Novaa Ltd	Dublin	OH
Novateur Research Solutions LLC	Leesburg	VA
NP Photonics, Inc.	Tucson	AZ
Numerica Corp.	Fort Collins	CO
Nutronics, Inc.	Longmont	CO
Nuvotronics	Radford	VA
ObjectSecurity LLC	San Diego	CA
Oceanit Laboratories, Inc.	Honolulu	HI
Oleson Convergent Solutions LLC	Santa Barbara	CA
Omega Optics, Inc.	Austin	TX
optoXense, Inc.	San Ramon	CA
Ozark Integrated Circuits, Inc.	Fayetteville	AR
P3 Technologies	Jupiter	FL
PC Krause and Associates, Inc.	West Lafayette	IN
Perceptive Innovations, Inc.	Ashburn	VA
Peregrine Falcon Corp.	Pleasanton	CA
Phase Sensitive Innovations, Inc.	Newark	DE
Physcial Optics Corp.	Torrance	CA
Physical Sciences, Inc.	Andover	MA
Physics, Materials, and Applied Mathematics Research	Tucson	AZ
Pierce Aerospace	Carmel	IN
Plasmonics, Inc.	Orlando	FL
Plasticity, Inc.	Santa Clara	CA
Pointwise, Inc.	Fort Worth	TX
Polaris Sensor Technologies, Inc.	Huntsville	AL
Pretalen	Beavercreek	OH
Progeny Systems Corp.	Manassas	VA
Progressive Technology Federal Systems, Inc.	North Bethesda	MD
ProSensing	Amherst	MA
Protection Engineering Consultants LLC	San Antonio	TX
Qualtech Systems, Inc.	Rocky Hill	CT
QuantCAD LLC	Iowa City	IA
Quantum Applied Science and Research, Inc.	San Diego	CA
quinc.tech, Inc.	San Diego	CA
QuinStar Technology, Inc.	Torrance	CA

FIRM	CITY	ST
QUNAV LLC	Fort Walton Beach	FL
Qynergy Corp.	Albuquerque	NM
RAM Photonics LLC	San Diego	CA
RAYN Innovations LLC	Tempe	AZ
RC Integrated Systems LLC	Torrance	CA
R-DEX Systems, Inc.	Marietta	GA
Regher Solar LLC	Tempe	AZ
Renaissance Services	Fairborn	OH
Reservoir Labs, Inc.	New York	NY
Robotic Research LLC	Gaithersburg	MD
ROCCOR LLC	Longmont	CO
Rocky Mountain Scientific Laboratory, LLC	Littleton	CO
Rotoye LLC	Marietta	GA
S. D. Miller and Associates PLLC	Flagstaff	AZ
SA Photonics, Inc.	Los Gatos	CA
Sabre Systems, Inc.	Warrington	PA
SafeFlights Inc. D/B/A 14bis Supply Tracking	Houston	TX
SARCOS Group LC	Salt Lake City	UT
Scaled Power, Inc.	San Francisco	CA
Scientific Forming Technologies Corp.	Columbus	OH
Scientific Systems Company, Inc.	Woburn	MA
Sciperio, Inc.	Orlando	FL
SciTec, Inc.	Princeton	NJ
Securborator, Inc.	Melbourne	FL
Select Engineering Services	Layton	UT
Shepra, Inc.	Punta Gorda	FL
SI2 Technologies, Inc.	North Billerica	MA
Sickweather	Baltimore	MD
Silicon Space Technology Corp. D/B/A VORAGO Te	Austin	TX
Silverthread, Inc.	Cambridge	MA
Sivananthan Laboratories, Inc.	Bolingbrook	IL
Skyward, Ltd.	Dayton	OH
Smart Information Flow Technologies, D/B/A SIFT	Minneapolis	MN
Solid State Scientific Corp.	Hollis	NH

Small businesses selected for Air Force SBIR|STTR award in FY2018. *(continued)*

FIRM	CITY	ST
Sonalysts, Inc.	Waterford	CT
Southwest Sciences, Inc.	Santa Fe	NM
Space Sciences Innovations, Inc.	Oswego	NY
Special Aerospace Services LLC	Boulder	CO
Spectral Energies LLC	Beavercreek	OH
Spectral Imaging Laboratory	Pasadena	CA
Spectral Sciences, Inc.	Burlington	MA
SPIRITECH Advanced Products, Inc.	Tequesta	FL
Sporian Microsystems, Inc.	Lafayette	CO
Square One Systems Design, Inc.	Jackson	WY
SRICO, Inc.	Columbus	OH
St. Johns Optical Systems LLC	Sanford	FL
Stellar Science Ltd Co.	Albuquerque	NM
Stottler Henke Associates, Inc.	San Mateo	CA
Streamline Numerics, Inc.	Gainesville	FL
Structured Materials Industries	Piscataway	NJ
Supercool Metals LLC	New Haven	CT
Surface Optics Corp.	San Diego	CA
Systems and Materials Research Corp.	Austin	TX
Systems and Technology Research	Woburn	MA
SYSTIMA Technologies, Inc.	Kirkland	WA
Tao of Systems Integration, Inc.	Hampton	VA
Tau Technologies LLC	Albuquerque	NM
TDA Research, Inc.	Wheat Ridge	CO
Technology Assessment and Transfer, Inc.	Annapolis	MD
Technology in Practice	Phelan	CA
Technology Service Corp.	Silver Spring	MD
Terametrix LLC	Ann Arbor	MI
Texas Biochemicals, Inc.	College Station	TX
Texas High Energy Materials LLC	Austin	TX
Texas Research Institute Austin, Inc.	Austin	TX
The Design Knowledge Company	Fairborn	OH
The Perduco Group, Inc.	Beavercreek	OH
The Samraksh Company	Dublin	OH
The White House Partners Consulting LLC	Sarasota	FL
Thermal Wave Imaging, Inc.	Ferndale	MI
ThermAvant Technologies LLC	Columbia	MO
ThermoAnalytics, Inc.	Calumet	MI

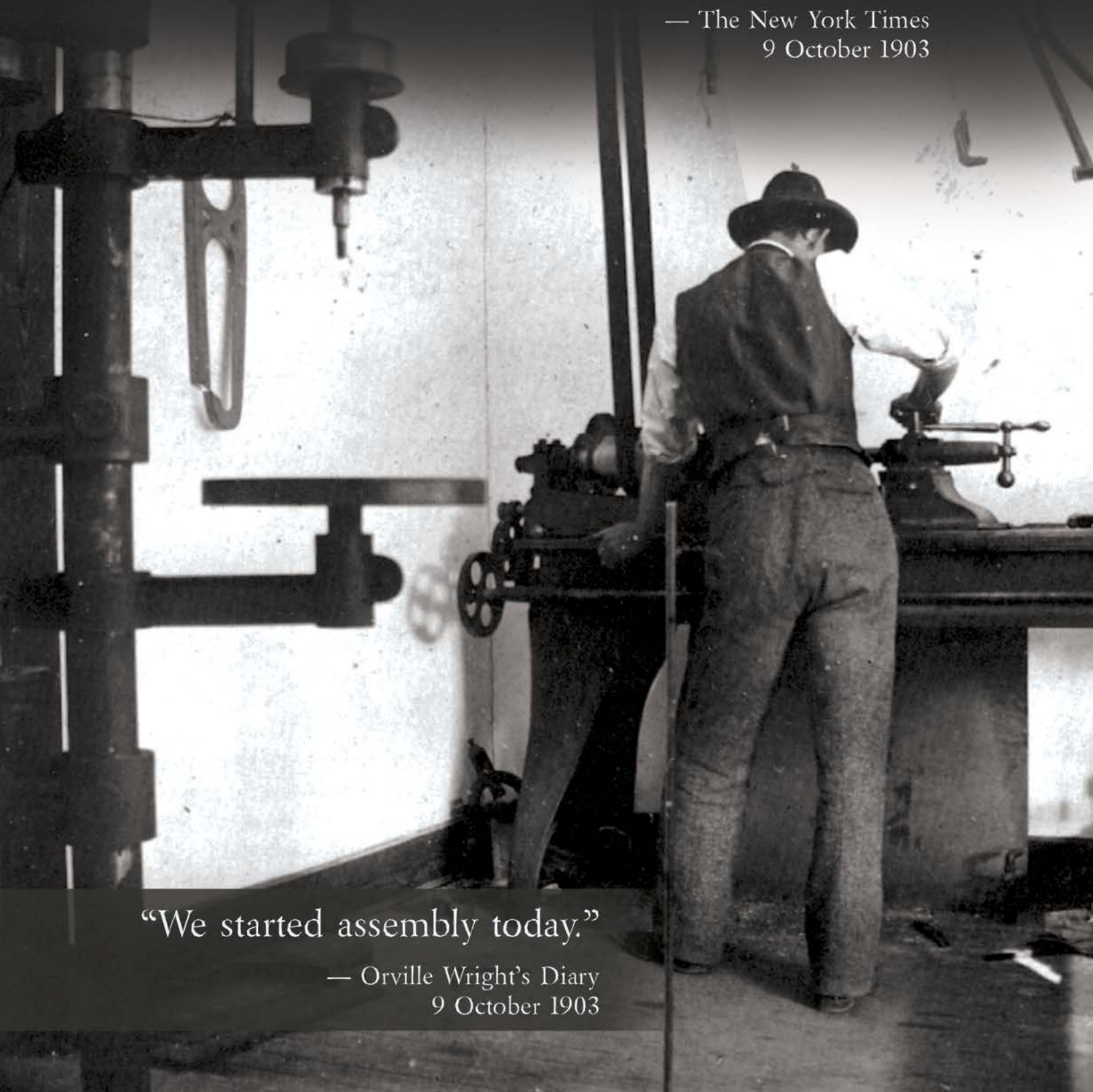
FIRM	CITY	ST
TiaLinx, Inc.	Irvine	CA
Tier 1 Performance Solutions LLC	Covington	KY
TMA Power LLC	Hobe Sound	FL
TORC Robotics, Inc.	Blacksburg	VA
Toyon Research Corp.	Goleta	CA
Traclabs, Inc.	San Antonio	TX
Trex Enterprises Corp.	San Diego	CA
Trident Systems, Inc.	Fairfax	VA
Trillium Engineering LLC	Hood River	OR
Tristan Technologies, Inc.	San Diego	CA
Triton Systems, Inc.	Chelmsford	MA
Truventic LLC	Orlando	FL
TXL Group, Inc.	El Paso	TX
Tyvak Nano-Satellite Systems, Inc.	Irvine	CA
United Protective Technologies LLC	Locust	NC
Universal Technology Corp.	Dayton	OH
Vadum	Raleigh	NC
Vector Atomic, Inc.	Oakland	CA
Vector ElectroMagnetics, LLC	Beavercreek	OH
Veracity Engineering	Washington	DC
Veracity Forecasting and Analysis	Alexandria	VA
Vigilant Cyber Systems, Inc.	Mount Airy	NC
VISHWA Robotics	Cambridge	MA
VISTOLOGY, Inc.	Framingham	MA
Vlabs LLC	Peachtree Corners	GA
Voxel, Inc.	Beaverton	OR
W5 Technologies, Inc.	Scottsdale	AZ
WASATCH Molecular, Inc.	Salt Lake City	UT
WesTest Engineering Corp.	Farmington	UT
WPL, Inc.	Manhattan Beach	CA
WW Technology Group	Ellicott City	MD
Xdot Engineering and Analysis, PLLC	Charlottesville	VA
XL Scientific LLC D/B/A Verus Research	Albuquerque	NM
Yotta Navigation Corp.	Santa Clara	CA
ZKxKZ LLC	Lexington	MA
ZONA Technology, Inc.	Scottsdale	AZ

“The flying machine which will really fly might be evolved by the combined and continuous efforts of mathematicians and mechanics in from one million to ten million years.”

— The New York Times
9 October 1903

“We started assembly today.”

— Orville Wright's Diary
9 October 1903





[HTTPS://WWW.AFSBIRSTTR.AF.MIL](https://www.afsbirsttr.af.mil)