AIR FORCE STEM
Science, Technology, Engineering, & Mathematics

THE 2016 YEAR IN REVIEW
As Chairman of the Air Force science, technology, engineering, and math (STEM) Advisory Council, I am pleased to introduce the inaugural Air Force STEM Outreach Yearbook. This document highlights the outstanding work our Airmen, both military and civilian, are doing to help build the next generation of STEM professionals.

The Air Force operates with global preeminence across all warfighting domains through innovation – whether in air, space, or cyberspace. We do this with world class, technical talent. To embrace strategic agility and maintain technological superiority into the future, we must attract and develop STEM-trained and STEM-literate Airmen who can critically think, adapt their behavior, and embrace diversity in thought. The Air Force K-12 STEM Outreach Program is at the core of our effort to ensure our Nation’s youth can be these Airmen of tomorrow.

Every day, Air Force professionals are in local classrooms providing hands-on demonstrations, mentoring students, judging science fairs, and providing numerous other activities in support of tomorrow’s STEM workforce. Many of these events are happening in underrepresented communities ensuring STEM outreach is impacting those needing the most help.

The Air Force has long maintained a strong volunteer culture and we understand the positive impact we can make in local classrooms. We have exciting technologies we can bring to bear, and thousands of professionals willing to make a difference. We encourage all Airmen to mentor and champion the next generation to pursue interests in STEM…for the Air Force and the Nation!

ARNOLD W. BUNCH, JR., Lt Gen, USAF
Military Deputy, Office of the Assistant Secretary of the Air Force (Acquisition)
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The Air Force STEM strategic roadmap, *Bright Horizons 2.0*, sets the path for all STEM activities in the Air Force. The Air Force K–12 STEM outreach program directly supports *Bright Horizons 2.0* Goal 4, “Outreach,” which focuses on increasing the STEM talent pool in the Air Force.

**AF STEM K–12 Outreach Goals**

**OBJECTIVE 1:** Institutionalize and Coordinate STEM Outreach throughout the Air Force
An important component of the K–12 outreach program is to create awareness and coordinate the varied AF K–12 STEM outreach activities and to develop policy to help direct the program.

**OBJECTIVE 2:** Leverage Industry, Schools, and other Government Agencies’ K–12 STEM Outreach Investments and Initiatives
The AF K–12 STEM Outreach Program will work with other government entities, not for profits, industry, and academia, to identify ways to improve K–12 STEM opportunities in the U.S.

**OBJECTIVE 3:** Increase the Effectiveness of the Air Force Investment in K–12 STEM Outreach
The AF K–12 STEM outreach effort will continue to annually evaluate its programs to increase their effectiveness. Additionally, we will continue to explore ways to better support traditionally underrepresented communities and military children.
The Air Force provides numerous K–12 STEM outreach opportunities across more than 30 locations each year. Our Airmen, both military and civilian, serve as mentors, science fair judges, and guest speakers. They also provide tours, hands-on demonstrations, and many other learning opportunities for local schools.

The Air Force also partners with national K–12 STEM outreach programs to make these outstanding opportunities available to K–12 students both on base and in local communities.

**In 2016, the Air Force K–12 STEM outreach program:**
- Impacted nearly 200,000 children
- Supported over 3,000 K–12 STEM events
- Volunteered over 90,000 hours to K–12 STEM outreach

For more information on Air Force STEM K–12 outreach programs, visit: [www.afstem.org](http://www.afstem.org) or Facebook at "AirForceSTEM."
AFOSR Mission

The Air Force Office of Scientific Research (AFOSR) continues to expand the horizon of scientific knowledge through its leadership and management of the Air Force's basic research program. As a vital component of the Air Force Research Laboratory (AFRL), AFOSR's mission is to support Air Force goals of control and maximum utilization of air, space, and cyberspace.

AFOSR accomplishes its mission by investing in basic research efforts for the Air Force in relevant scientific areas. Central to AFOSR's strategy is the transfer of the fruits of basic research to industry, the supplier of Air Force acquisitions; to the academic community, which can lead the way to still more accomplishment; and to the other directorates of AFRL that carry the responsibility for applied and developmental research leading to acquisition.

AFOSR currently distributes its basic research program investment through 1,200 grants at over 200 leading academic institutions worldwide, 100 industry-based contracts, and more than 250 internal AFRL research efforts.

STEM Efforts

AFOSR has supported such events as the Junior Sciences and Humanities Symposium (JSHS) and USA Science & Engineering Festival and Patriots Technology Training Center.

JSHS is designed to challenge and engage students (Grades 9–12) in STEM. Individual students compete for scholarships and recognition by presenting the results of their original research efforts before a panel of judges and an audience of their peers.

The USA Science & Engineering Festival is a national grassroots effort to advance STEM education and inspire the next generation of scientists and engineers. In 2016, the festival brought approximately 300,000 students to the Washington D.C. area.

Patriots Technology Training Center: AFOSR serves the Washington D.C. metropolitan area with support to the Patriots Technology Training Center, located in the suburbs in Prince George's County, MD. Patriots have served thousands of students and community residents with a mix of opportunity, information and educational competitions. The organization holds monthly meetings; operates summer camps, youth summits, STEM competitions, conference on technology; and facilitates workshops that focus on preparing participants for the STEM competitions.

We are looking to expand our STEM outreach to other institutions and organizations in the Washington D.C. metropolitan area as well as pursuing opportunities at the Coppin Academy in Baltimore, MD, Endeavor Elementary School in Cocoa, FL, and the DU WISHED program in New Orleans, LA.

AFOSR: Arlington, VA POC: Ed Lee, Phone: 703.696.7318, Email: edward.lee@us.af.mil
Arnold AFB (TN)

Arnold Engineering Development Complex (AEDC) STEM Educational Outreach Mission: To facilitate partnerships with the Tennessee K–12 educational community to increase student awareness and excitement in all fields of STEM including aviation and aerospace to develop our nation’s future scientific and technical workforce. We leverage the educational community and the many technical professionals at AEDC to impact over 14,000 students and support the following programs:

- **StellarXplorers**: two teams at the local AF Junior ROTC Program
- **CyberPatriot**: two teams at the local AF Junior ROTC Program and one at the Local Civil Air Patrol
- **Team America Rocketry Challenge**: seven teams; one went to Nationals last year
- **FIRST® Programs**:
  - 7 Jr. LEGO® League Teams
  - 4 FIRST® Tech Challenge Teams
  - 24 LEGO® League Teams
  - 1 FIRST® Robotics Competition Team
- **Reach for the Stars National Rocket Competition**: ~25 students competed at our annual event, and last year’s winner was selected as one of the four national finalists.
- **STEM Summer Camp**: held annually for 20 students
- **STEM Aviation Program**: taught STEM principles using the Fly to Learn flight simulation software supporting over 100 students last year
- **NASA Human Exploration Rover Challenge**: supported three local high school shop classes to construct and race in this annual event at the Huntsville Space and Rocket Center
  - **MathCounts**: sponsored up to ten middle school teams and helped host the local competition the University of TN Space Institute located on base
  - **Discovery Dome**: took our portable planetarium to dozens of schools to teach astronomy and present custom, grade-appropriate STEM shows
  - **STEM Center**: hosted ~2000 visitors who enjoy science demonstrations and hands-on activities
  - **STEM Lending Library**: checked out STEM materials including robots,

portable wind tunnels, rocket launchers, ARIES Exploring Motion & Forces Kits, WeDo and Cubelet Robotics kits

- **Arnold STEM Website**: maintained a website of our STEM outreach activities and offerings [www.arnold.af.mil/stem/](http://www.arnold.af.mil/stem/)

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Air Force STEM

Edwards AFB (CA)

Edwards Air Force Base, located between Bakersfield and Los Angeles, CA, is the key base for Aerospace Systems development and testing in the Air Force. It is home to the Air Force Test Center, Armstrong Flight Research Center/NASA, Air Force Test Pilot School and the Air Force Research Laboratory (AFRL) Rocket Lab. The Antelope Valley (AV) has one of the largest concentrations of Aerospace Industries in the United States, including the nearby AF Plant 42 and the Mojave Space Port, and is constantly in need of new local STEM talent who are looking to start their career in the area. The Edwards AFB STEM program has risen to the challenge of developing new STEM opportunities that are available for those interested in or already pursuing an education in Science, Technology, Engineering and Mathematics. We support education with an appreciation for engineering and science that helps develop our technical workforce to advance our warfighters’ capabilities. Edwards STEM is a growing program that continues to seek out new ways to reach the local community. The program does not just want to educate students but to also inspire them to see that their dreams are achievable.

Civil Air Patrol: Edwards STEM supports its own Civil Air Patrol unit and other units around the base. We were able to arrange for a week-long summer camp near Edwards AFB. The 51 cadets attending were able to see the F22 and Global Hawk, and visit the museum. We also host local CyberPatriot competitions at the Test Pilot School.

Tours/Career Days: Edwards STEM supports career days and tours of the base. Edwards AFB has led tours for over 1200 students including Helendale School, Tehachapi High School, and The Palmdale Aerospace Academy, and had a booth at the “Salute to Youth” conference, where they were awarded the “Most Interactive Booth,” after their interactive robotics made contact with 2,600 students.

AFRL UAV Challenge: The AFRL Rocket Lab and Edwards STEM combined to sponsor the first AFRL UAV Challenge, allowing 120 students from 12 schools to do hands-on engineering and fly UAVs.

Edwards AFB STEM Outreach Programs:
- FIRST Robotics Team Sponsorship/Mentorship
- Science Olympiad (AV & Los Angeles)
- AFRL UAV Challenge
- Edwards/Mojave/Tehachapi Rocket Challenge
- AV Regional Science Fair
- CyberPatriot Challenge Teams
- Summer STEM Gateway Camps
- Teacher/Engineer Job Shadowing
- Tutoring/Mentoring/Speakers

Edwards AFB: Lancaster, CA POC: Dr. Kriss Vanderhyde, Phone: 661.275.5499 Email: kriss.vanderhyde@us.af.mil
The Air Force Research Laboratory Munitions Directorate provides STEM outreach through a variety of ways, including robotics competitions for K–12 students, summer internships and community outreach. The Mini Urban Challenge high school robotics competition and the Eglin AFB Air Force Research Laboratory (AFRL) Scholars internship program provide students across a wide spectrum with direct access to relevant and real-world STEM opportunities. As a founding member of the Okaloosa STEM Coalition, the AFRL Munitions Directorate STEM Outreach office is at the heart of STEM growth throughout Northwest Florida.

**Mini Urban Challenge:** The only high school autonomous robotics competition in the nation! The competition focuses on coding and robotics as students learn to program their "car" to navigate a miniature city ... autonomously. In 2016, the competition included 57 teams from 49 high schools and over 350 students from 5 regions including California, Ohio, Louisiana, Florida, and Washington D.C.

**AFRL Scholars:** The AFRL Scholars Program offers stipend-paid summer internship opportunities to undergraduate and graduate level university students pursuing STEM degrees, as well as to upper-level high school students; select locations also offer internships to university students pursuing education-related degrees and K–12 professional educators. The Munitions Directorate hosted over 65 scholars in 2016, and we see plenty of growth into the future.

**Okaloosa STEM Coalition:** The AFRL Munitions Directorate is spearheading a coalition of STEM Education leaders from the Okaloosa County School District, the Doolittle Institute, the Emerald Coast Science Center and AFRL to significantly increase the impact and availability of STEM Education throughout the Florida panhandle. Working together with teachers, administrators and innovators, the coalition will work to bring STEM to over 30,000 students throughout the school district.

**Eglin AFB:** Okaloosa County, FL  
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Goodfellow Air Force Base, located in San Angelo, TX, is home to the 17th Training Wing and is one of the original 13 wings of the Air Force. Goodfellow is responsible for training the world’s finest DoD Fire Protection, Intelligence, Surveillance, and Reconnaissance professionals. San Angelo was recognized as the 2015 Altus Trophy Winner by Air Education and Training Command due to the outstanding support the community provides to Goodfellow. Goodfellow plays an active role in supporting STEM in San Angelo and its schools. 15 of 17 schools in San Angelo are categorized Title I with high numbers of children from low-income families. Goodfellow supports the San Angelo youth by providing STEM demonstrations and lectures to help ensure that all children meet challenging state academic standards.

Specialized Presentations: Goodfellow supports local San Angelo schools by providing unique, specialized presentations to support different STEM subjects in the classroom.

Diverse Subject Exhibitions: Goodfellow travels to many local schools to provide large-scale presentations that allow students access to ask Goodfellow personnel questions in specific STEM areas including, but not limited to: anatomy, biology, first aid using a SimMan training simulator, materials technology that keeps our Defenders safe, the science behind training military working dogs to detect different chemical signatures, light theory and optics, infrared technology, energy phenomenology, seismology, and physical sciences. This team truly represents the diversity of Air Force knowledge and expertise across many different career fields.

Goodfellow AFB STEM Outreach Programs & Activities:
- Annual Region-15 Robotics Competition hosted by Angelo State University
- Team Goodfellow Demonstration Team for Wall Independent School District
- Consolidated Learning Center Summer Reading Program
- Angelo State University J-ROTC Drill Competition STEM Exhibition
- San Angelo Museum of Fine Arts Family Day STEM Demonstrations
- Local San Angelo Elementary and High School lectures tailored to support curricula

Goodfellow AFB: San Angelo, TX
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Grand Forks AFB (ND)

Grand Forks AFB provides a K–12 STEM education outreach program to provide hands-on activities and opportunities to area youth. Our goal is to extend youth’s existing knowledge in STEM areas to spark further interest and study. Civilian and military personnel join forces with our community partners to support base and local initiatives engaging youth in North Dakota and Minnesota.

High School Career Forum: Annually, the Career Forum offers high school students hands-on experience with civilian and military career choices at Grand Forks AFB. Students tour the Unmanned Aerial Vehicle (UAV) program as well as visit different information booths with “tools of the trade.” Presenters answer student questions about job opportunities. Students are invited back to the base to job shadow in any career area in which they are interested.

Girls Aviation STEM Day: During Women’s History Month, STEM Day is geared towards girls in 7th- and 8th-grades. Students have hands-on experience with current technology in the RPA career field. The girls have the opportunity to pilot a mini RPA using a Samsung Tablet. Speakers focus their presentations on STEM course choices available in high school and college. Tours of the UAV program and air traffic control tower round out the day. This event is staffed entirely by women in related career fields!

Purple Up–Power On STEM Science Night: Purple Up–Power On celebrated military youth for serving alongside their military parent. Science night was supported by the Engineering Department of the local college. The School Liaison Office offers numerous opportunities throughout the year for diverse groups of students to experience STEM related activities. Activities are chosen based on the current interests and needs of the community.

Partnerships: Dakota Science Center, University of North Dakota (UND): Society of Women Engineers, Engineering, and Aviation, Boys and Girls Club of America, 4-H, Camp Invention, North Dakota Civil Air Patrol, Northrop Grumman, Grand Forks Library Systems.

Grand Forks AFB: Grand Forks, ND POC: Kelly Painter, Phone: 701.747.4484 Email: kelly.painter@us.af.mil
Hanscom AFB and Lincoln Lab (MA)

**Hanscom Air Force Base**

Students at Hanscom Primary School and their mentors present their results from Science Share. Science Share was an after school once a week hands-on activity that brought mentors from the Hanscom Military and Civilian community into the school to introduce student teams to scientific principles and experimentation with a focus on fun and teamwork.

**Lincoln Laboratory**

Lincoln Laboratory is a DoD federally funded research and development center working on problems critical to national security. The main facility is located on Hanscom Air Force Base in Lexington, MA. Our outreach initiatives for all grade levels are inspired by employee desire to motivate student interest and participation in hands-on engineering, science, and mathematics.

**LLRISE Program:**

For two weeks, we host 18 rising high-school seniors for the Lincoln Laboratory Radar Introduction for Student Engineers (LLRISE) in which participants build their own Doppler and range radars. Students learn CAD, 3D printing, circuit board assembly, electromagnetics, pulse compression, signal processing, programming, and electronics. **Cumulative impact:** 155 students. Explosive growth is expected since three universities adopted this program and more are scheduled to do so.

**Girls Who Build Cameras:**

This one-day workshop teaches girls how to build a Raspberry Pi camera and program image filters. The students dabble in optics, computer science, and mechanics, getting a taste of several different types of engineering. The workshop includes demonstrations of how simple cameras can be applied to research work at Lincoln Laboratory. **Cumulative impact:** 40 girls. Exponential growth is expected since this workshop was recently added to MIT’s online courseware.

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**Lincoln Lab:** Bedford, MA POC: Dave Granchelli, Phone: 781.981.4204 Email: granchelli@ll.mit.edu
Hill AFB (UT)

Hill Air Force Base is located near Ogden, UT and has a very robust K–12 STEM Outreach program. Our outreach provides funding for over 25 STEM programs, and employees donate 2500 hours in the local community each year for over 100 STEM events. This enables us to contact over 15,000 students each year with an inspiring message on STEM career opportunities at Hill Air Force Base and beyond. We work with individual teachers as well as school districts, the Utah STEM Action Center, many industry partners, and higher education to coordinate and expand our reach to exciting students throughout Utah to pursue a STEM career.

One of our biggest events is “Mission to Mars,” during which 50 volunteers help 350 5th-grade students “inhabit” Mars for a day.

We support Rural Utah STEM Roadshows which go to students in areas that don’t have the means or the time to attend large STEM events that are held in metro areas.

Our outreach to girls is extensive and includes supporting all-girl events such as Expanding Your Horizons, SheTech, and Girls Go Digital.

Girls Go Digital allows girls to hack, design, code and make for four fun-filled days.

Programs and Activities:

- FIRST and VEX Robotics
- Underwater Robotics
- STARBASE
- Code.Org
- Girls Go Digital
- Minecraft Coding Camp
- Expanding Your Horizons
- SheTech
- STEM Expos and Festivals
- STEM Roadshows
- Rube Goldberg Competition
- Boy and Girl Scouts
- Technology Student Association
- CyberPatriot
- Team America Rocketry Challenge
- MESA
- Science Olympiad
- Junior Achievement
- Mission to Mars
- Science Fair Judging
- Career Presentations and Demos
- Aerospace Museum STEM Program
- Rocky Mountain Celebration of Women in Computing

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The 704th Test Group at Holloman AFB, NM is a unit of the Arnold Engineering Development complex (AEDC) at Arnold AFB, TN, which is part of the Air Force Test Center, headquartered at Edwards AFB, CA. The 704th Test Group’s mission is to operate world-class test facilities for high-speed sled track testing, navigation and guidance system testing, radar signature measurements, weapon systems flight testing, and Air Force Liaison for all AF programs tested at White Sands Missile Range (WSMR).

The 704th Test Group STEM outreach mission is to support all of Otero County in cooperation with community education partners including New Mexico State University-Alamogordo (NMSU-A), NM Space Museum, Alamogordo Public Schools, Otero STEM, and Civil Air Patrol. The team received the “Exemplary Community Partnership — Pete Taylor Partnership of Excellence Award” in 2015 and 2016.

Our scientists and engineers at the 704th Test Group:

- Support FIRST competitions with mentors, coaches, and executing of DoD grants
- Provide in-class lectures, projects and science demonstrations to K–12 and college-level students
- Organize university student design competitions at the Holloman High Speed Test Track
- Customize Test Group tours of STEM-related careers/technologies for students and families

Local military officers designed and built hands-on traveling demonstrations to explain mechanical advantage using levers and pulleys and a simple electric motor. These demos are taken to school science fairs and other science related community activities, providing hands-on learning and interaction with students and Air Force STEM role models.

Engineers from the 704th Test Group spent a week at La Luz Elementary teaching a wind speed project. Here a group of kids show off part of their project.

Fifteen FIRST Lego League teams met to polish technical, team, and public speaking skills prior to formal competition. Students, families, educators and community STEM supporters filled the NMSU-A Tays Special Events Center.

HAFB hosted the 4th annual NM Aviation Aerospace Association Career Expo, the largest event of its kind in the U.S. Over 2,500 middle & high school students from across NM attended and learned about different STEM fields. U.S. Rep Steve Pearce spoke about his flying experiences and encouraged them to choose a STEM career path.
Air Force Research Laboratory (AFRL) New Mexico, which includes the Space Vehicles Directorate and Directed Energy Directorate, located at Kirtland Air Force Base (KAFB) in Albuquerque, New Mexico, impacts more than 10,000 students annually through the hands-on K–12 STEM outreach opportunities provided through its AFRL La Luz Academy. These include recurring annual activities called “missions” and strategic partnerships with other organizations to support the advancement of STEM in the community both at the local and national levels.

The goal of the AFRL La Luz Academy is to increase the pool of qualified STEM job applicants for military, civilian, and contractor positions related to DoD technologies. To meet this goal, the AFRL La Luz Academy strives to increase awareness and interest in both STEM content and STEM careers, to attract underrepresented students to STEM, and to involve AFRL STEM professionals in STEM outreach.

**AFRL La Luz Academy Missions:** These structured, annual activities fall into two broad categories: those that take place at KAFB and provide 15+ contact hours for student participants; and those that take place primarily on-site at schools with a culminating activity sponsored by AFRL New Mexico that provides 4+ contact hours for student participants. All missions are aligned with national and state content standards.

DoD STARBASE New Mexico and the TECH Mission take place at KAFB. The Mission to Mars, Robotics Challenge, and STEM Challenge involve teachers in a training session and then are implemented primarily on-site at each participating school.

**Strategic STEM Community Partnerships:** AFRL New Mexico maintains a STEM Demo Lending Library comprising more than 100 field-tested demos for AFRL scientists and engineers to check out and share with the community. These materials, as well as curriculum and equipment from the various missions, are used to conduct STEM outreach with strategic partners in the local and national STEM community.

**2016 STEM Community Activities:** Albuquerque International Balloon Fiesta Near Space Challenge, Big Brothers Big Sisters STEM Discovery Festival, DoD STARBASE 2.0, Explora’s ABQ STEM Fiesta, Math with Infinite Technology Teacher Workshop, National Museum of Nuclear Science Discover STEM Week, New Mexico State University PREP Academy, Team America Rocketry Challenge, Tuskegee Airmen Youth Aviation and Aerospace Camps, USA Science & Engineering Festival, White House National Week at the Labs.

Kirtland AFB: Albuquerque, NM POC: Ronda Cole, Phone: 505.846.8042 Email: ronda.cole.ctr@us.af.mil
The Cryptologic & Cyber Systems Division (CCSD) at JBSA–Lackland adopted the Bright Horizons 2.0 STEM workforce strategy, which outlines the guidance on how to leverage Air Force STEM expertise, technical facilities/equipment and STEM concepts to the next generation. The goal is simple; to increase the local STEM talent pool by connecting as many students to influencers as possible, including those underrepresented in STEM, through various local STEM outreach activities. We understand that STEM outreach is important to ensure the Air Force stays in the forefront of air superiority by invigorating future generations. The race to be the leaders in future technology and ideas will be difficult; however, we accept the challenge and confidently lift off towards our “Bright Horizons.”

**American Society for Materials Camp:** A one-week free workshop that helps high school and middle school STEM teachers engage students using simple, low-cost, science experiments that can be integrated into existing lesson plans. Teachers perform the experiments on site and then leave with a generous amount of supplies for their students to conduct the experiments.

**Expanding Your Horizons:** A one-day conference aimed at increasing middle school girls’ interest in STEM careers. Women engineers from CCSD share personal experiences, conduct a hands-on workshop, and motivate over 500 girls to consider STEM opportunities.

**Texas A&M International University (TAMIU) STEM Alliance:** A two-day event promoting the advancement of STEM education among approximately 600 middle and high school students in the Laredo, Texas area through outreach activities to educate and inspire tomorrow’s STEM leaders.

**CyberPatriot:** A premiere national middle and high school cyber defense competition created to inspire students toward careers in cybersecurity, teaching skills critical to our nation’s future. San Antonio fielded 198 teams during the 2015–2016 season, more than any other city in the U.S., with two teams advancing to the National Championship.

**Solar Car Race:** An exciting event in which teams of 4th- and 5th-grade students design, build, test, and race their own unique solar car in a district-wide competition. Students receive mentoring from local engineers that not only share their knowledge and skills but also serve as role models for these students. In 2016, there were 319 teams from across the state.

**CCSD’s Annual STEM Events:**
- National Science Bowl
- Pre-Freshmen Engineering Program
- TAMIU STEM Alliance
- Expanding Your Horizons (EYH)
- Cyber Patriot
- FIRST Robotics
- ASM Camp
- Solar Car Race

**With Pride.....World Wide!**

Lackland AFB: San Antonio, TX POC: Ron Garcia Phone: 210.925.2593 Email: ronald.garcia.1@us.af.mil
Los Angeles AFB (CA)

Los Angeles Air Force Base is located in El Segundo, CA, and is the only active duty military installation in the greater Los Angeles Metropolitan area. Los Angeles Air Force Base is the home of the Space and Missile Systems Center (SMC). SMC, a subordinate unit of Air Force Space Command, is the center of technical excellence for developing, acquiring, fielding and sustaining military space systems. SMC’s mission is to deliver resilient and affordable space capabilities.

The goal of the SMC STEM Outreach Program is to foster a new generation of scientists, mathematicians, engineers, and technologists who will one day discover and problem solve in the Air Force’s program offices, laboratories, and supporting companies. SMC works closely with the Los Angeles Unified School District and supports the district’s Beyond the Bell initiative to inspire learning and achievement beyond the regular school day. SMC’s program impacts over 4,000 students and 100 teachers across 60 schools and is continually growing.

Heritage Center Tours: The SMC Heritage Center is a field heritage activity for the National Museum of the Air Force comprising historical exhibits contained within Los Angeles Air Force Base. Volunteers hosted numerous tours that showcased the rich space heritage of SMC, provided hands-on activities, and included mentoring sessions. Students from Ivy League School in Torrance had the rare opportunity to touch a Delta II rocket motor casing that launched GPS IIR-6 into orbit (above right).

STEM Programs: SMC supported STEM programs such as StellarXplorers, in which aerospace engineers tutored students in orbital dynamics to help support spacecraft/payload development and operation, CyberPatriot, in which students worked to protect a computer network against vulnerabilities under the mentorship of team volunteers, and Onizuka Space Science Day at El Camino College, where students of all ages participated in a variety of interactive science activities and hands-on experiments assisted by company grade officers.

Local STEM Activities: SMC supported a wide variety of STEM-related activities across Los Angeles, including career days, science fairs, afterschool science nights, and community events. Students from Center Elementary School (above middle right) built a “Mint Mobile” made of paper and mint wheels for a downhill race and bragging rights, learning the importance of aerodynamics along the way. Aspiring engineers built and launched their own model rockets at the Torrance Armed Forces Day (above left). Students learned about space careers (right) during the Los Angeles Chamber of Commerce Career Fair.

Los Angeles AFB: Los Angeles, CA POC: Lt Col Alec Porter Phone: 310.653.2079, Email: alec.porter@us.af.mil
The Air Force Maui Optical & Supercomputing (AMOS) site, managed by the Air Force Research Laboratory (AFRL) and located on Mt. Haleakalā on the Hawaiian island of Maui, has a unique operational and R&D environment that provides new space surveillance technology for Air Force Space Command and critical decisional information for our nation’s space security.

In support of AF STEM Outreach, AMOS 1) conducts activities in teacher education, curriculum development and hands-on, 2) executes chemistry, astronomy, and engineering experiments, 3) provides educational materials to teachers via a STEM equipment lending library, 4) hosts summer internships for state collegiate students, and 5) maintains a web-driven, internationally accessible outreach telescope. All of these efforts are supported within the framework and spirit of AMOS’ mission of operational space situational awareness for AFRL and its partners.

AMOS/MEDB Lending Library: AMOS partners with the Maui Economic Development Board (MEDB), a 501(c)(3) nonprofit, to augment Maui K–12 schools’ science class equipment/curriculum with a lending library. FY16 additions: Portable planetarium; portable adaptive optics kit

Introduce a Girl to Astronomy Day: Through MEDB’s Women in Technology program, AMOS regularly hosts 50–60 elementary/middle school students and their teachers at the summit of Haleakalā for observatory tours, hands-on activities, and career path presentations in an effort to increase women and underrepresented minority interests in STEM. FY16 impacts: 5 schools, 100+ students, 4 organizations: AFRL, Boeing, MEDB, University of Hawaii (UH)

Aloha Outreach Telescope: AFRL, Georgia Tech, and UH partnered to provide an 11-inch telescope at AMOS’ sea-level research park for remote operation over the internet. Schools across the country can be taught telescope operation, control, and data acquisition. Projected annual impacts: 40 teachers, 1500 students, and many high school research projects

Other AMOS Outreach Programs and Activities

- Akamai Workforce Initiative
- Hawaii STEM Conference
- Introduce a Girl to Engineering Day
- Tech Careers Day
- Tutoring/Mentoring
- Various classroom visits ... and much more!

AMOS Conference Space Exploration Day
- Excite Camp
- Teacher Workshops
- Science & Career Fair Support
- White House National Week at the Labs

Maui Optical Station: Maui, HI POC: Dr. Ryan Swindle, Phone: 808.891.7746, Email: thomas.swindle@us.af.mil
McConnell AFB (KS)

McConnell AFB STEM Outreach Program is working diligently to increase student engagement from pre-K thru grade 12, particularly those from underrepresented groups, through proactive STEM opportunities. McConnell AFB houses the second largest fleet of KC-135s and has a variety of Air Force Specialty Codes (AFSC) that use STEM in a multitude of areas to solve day-to-day problems.

Every fall, the McConnell STEM Rally hosts students from surrounding areas. Here, Airmen from a large range of AFSCs host a booth representing their career field and how it is impacted by STEM. In November 2015, the program hosted over 200 high school students. In 2016, the STEM Rally hosted about 200 students ranging from third grade thru twelfth grade, to include military dependent children in the same school-age range, cadets from local AF JrROTC programs, and cadets from the Civil Air Patrol. In addition to displays and small group discussions held by the airmen, the STEM Rally includes aircraft tours, an air-to-air refueling simulator, and other hands-on activities.

Currently, the Working Group has established partnerships with Wineteer Elementary School and the McConnell Youth Center to participate in the FIRST LEGO League Jr and FIRST LEGO League competitions. The leagues are supported with the necessary funds as well as coaches and mentors to guide the students as they tackle real-world scientific challenges.

At the end of summer 2016, two new partnerships emerged: Mclean Science/Technology Magnet Elementary School and Women in Aviation. Both partnerships include lectures, small group discussions, tutoring and mentoring, as well as hands-on activities at the school’s campus and the STEM Learning Center on base, as well as during aircraft tours.

In addition, the Working Group will be looking at partnering with the STEM Million Women Mentorship (MWM).

McConnell AFB: Wichita, KS  POC: Amy Jensen, Phone: 316.759.6020  Email: amy.jensen@us.af.mil
STARBASE: Provided exciting and fun STEM education with hands-on activities and lessons to 1,131 students from 24 schools. Partnered with local agencies and units to provide real-world applications of STEM career fields and reinforce Air Force’s cutting edge STEM job opportunities.

Regional AF STEM Camp: Peterson AFB was chosen as host site of a Regional AF STEM Camp to introduce 24 middle schoolers from around the AF to a number of programs related to circuits, robotics, molecular models, Engineering Design, Computer Aided Design (CAD), and 3-D printing. The camp focus was on youth “creating technology” versus just being a “user of technology.” Key Partnerships/Collaborations: STARBASE, CO 4-H University Extension, Challenger Learning Center.

School Support: $10K provided supplemental STEM education to 4 local schools. Partnered with Sylvan Learning Center to integrate video game design, robotics, and coding into curriculum for focused groups of students. FY16 Impacts: 10 school districts, 4 public charter schools, 10,557 military connected students.

School Age Care STEM Room: Converted existing room in School Age Program to focus on STEM programming for children 5–12 years. This has become a favorite room for 70+ kids due to state-of-the-art materials and knowledgeable, fun, caring teachers.

National Youth Science Day: Partnered with Colorado 4-H University Extension to execute dynamic STEM-related projects for school aged youth. 120 youth impacted annually!

Peterson AFB/Colorado Springs STEM Team: Developing partnerships with private and public organizations that have a vested interest in STEM and sparking enthusiasm in these areas to assure the supply and recruitment of highly qualified scientists and engineers to the workforce.

As a group, we will strive to work together to deliver outstanding STEM resources and programs to the Peterson AFB community in a coordinated, multi-disciplinary fashion.
Robins AFB (GA)

Robins AFB is located about 100 miles south of Atlanta, in the city of Warner Robins. It is the largest industrial complex in the state, providing depot-level maintenance, repair, and overhaul for the C-5, C-17, C-130, and F-15 fleet as well as software systems support, electronics repair, and program management for many other aircraft and weapon systems. Robins AFB employs over 13,000 civilians, including over 1,500 degreed scientists and engineers and hires about 100 new employees annually to cover attrition and support new workload. Georgia now has five universities with accredited engineering degrees. STEM Outreach is supply chain management for the pipeline providing the next generation of scientists, engineers, and technicians.

STEM Outreach is accomplished through several local partnerships. The Robins AFB Museum of Aviation is host to one of the oldest and largest DoD STARBASE programs, which this year celebrated its 20th anniversary, 1000th class group, and the dedication of two new classrooms. STARBASE Robins is funded by DoD with program management by the Air Force Reserve Command.

The Museum of Aviation also hosts the STEM Education Center, which provides summer and weekend camps for K–12 students and teachers, as well as the Georgia NASA Educational Resource Center, the Middle Georgia Youth Science and Technology Center (MGYSTC), and other programs. The Museum annually hosts the FIRST LEGO League Super Regional Qualifier, the Houston County Regional Science Fair, the Georgia STEM Teacher of the Year Awards, and other high profile STEM events. In 2016, the Museum hosted MATH ALIVE!, an interactive exhibit funded by Raytheon Corp.

Other STEM partnerships include the Houston County Board of Education, the Middle Georgia Regional Education Service Agency, and the Middle Georgia STEM Alliance, which is associated with the 21st Century Partnership. In 2016, Robins AFB supported two elementary schools in Houston County, which became the first in Middle Georgia to be STEM Certified. Robins AFB has also partnered with the Dayton Regional STEM Center to develop the STEM Fellows program locally and with the Defense Acquisition University to implement the STEM Problem-Based Enhanced Educator Development (SPEED) program, both for K–12 STEM Teachers.

Robins AFB provided 1931 volunteer hours in FY16 to support STARBASE Robins, STARBASE 2.0, science fairs, STEM Family Nights and Career Days, and competitive events for FIRST robotics events, Technology Student Association, the DoD Junior Science and Humanities Symposium, and others.

Robins AFB: Robins, GA POC: Jamie Cook, Phone: 478.926.1132, Email: jamie.cook@us.af.mil
Hill AFB, UT: Air Force Base volunteer Corbin Bell assists students in constructing a habitat during the “Mission to Mars” STEM event held at Weber State University, Ogden, Utah.


Vandenber AFB, CA: Tour for first year engineering students from Allan Hancock College, which will become an annual tour for AHC to showcase career aspirations to the young engineers in the making.

Rome Research Site, NY: Kids from the Central Association for the Blind and Visually Impaired are learning all about STEM and Cyber Technology. The camp is made up of 11 visionally impaired students around the area, and it focuses on teaching them how to use adaptive technology to make them more productive.

Scott AFB, IL: BMX Camp shows that mastering Newton’s Second Law and applying it hands-on can be fun!

Arnold AFB, TN: North Middle School students display rockets and an aerial drone used by the Rocket Club.
Tinker AFB, OK: With the help of their Tinker mentors, Carl Albert Middle School students work together to maneuver their SeaPerch Remotely Operated Vehicle through obstacles set up in the Midwest City YMCA pool.

McConnell AFB, KS: Airmen from the 22nd Logistics Readiness Squadron help local middle school students understand what equipment our military uses to keep them safe when they are deployed in a hostile environment.

Arnold AFB, TN: North Middle School students display rockets and an aerial drone used by the Rocket Club.

Los Angeles AFB, CA: Space and Missile Systems Center volunteers gathered at Center Street Elementary School to participate in the school’s Science, Technology, Engineering, and Mathematics Family Night.

U.S. Air Force Academy, CO: Middle school students visit the Air Force Academy for Audience with an Astronaut. Former NASA astronaut Dr. Jim Reilly spoke to students about his experiences in space and answered questions.

Patrick AFB, FL: Children learned to use a piano they created using Scratch software, during the 45th Space Wing’s All SySTEMs Go event designed to teach children of all ages about STEM.

McConnell AFB, KS: Airmen from the 22nd Logistics Readiness Squadron help local middle school students understand what equipment our military uses to keep them safe when they are deployed in a hostile environment.

Los Angeles AFB, CA: Space and Missile Systems Center volunteers gathered at Center Street Elementary School to participate in the school’s Science, Technology, Engineering, and Mathematics Family Night.
The Rome Research Site is the home of the Air Force Research Lab, Information Directorate. Our vision is to LEAD the Air Force and Nation in Command, Control, Communications, Computers, and Intelligence (C4I) and Cyber science, technology, research and development. AFRL/RI was the winner of the 2014 Federal Laboratory Consortium for Technology Transfer National STEM Award. Over 300 federal entities competed for this award!

**National Programs:**
- FIRST LEGO League, FIRST Tech Challenge, FIRST Robotics Competition
- CyberPatriot

**Organic Programs:**
- **Annual Challenge Competition** – High School Students compete for paid summer internships.
- **Staying Safe Online Workshop** – Provides valuable insight into threats, resources, and tools to help parents and kids learn how to stay protected while enjoying the benefits the internet has to offer.
- **LEGO Summer Camp** – Topics taught this week include how to use Gear Ratios, Locomotion and Energy, how to build and control a robot while putting it through a series of real world challenges, and building individual and teamwork skills.
- **Cyber Summer Camp** – Topics taught include Virtualization, Cyber Defense, Linux, internet and Services and Management.
- **Arduino Summer Camp** – Topics taught include Programming Fundamentals, Input/Output Devices, Basic Voltage & Current Calculations, various other Electronic Principles
- **Engineering Summer Camp** – Topics taught this week include Simple Machines, Archimedes’ Principle, Newton’s Laws of Motion, Basic Electronics, and DC Hobby Motors.
- **Drone Summer Camp** – Topics taught include UAS Concepts, safety of use, scientific principle of flight, science of aerodynamics & radio controlled vehicles, and introduction to local employment opportunities in the UAS & aviation field.
- **Raspberry Pi Teacher Training** – Teachers learn how to hook-up and program the Raspberry Pi to take pictures and detect real-world signals such as motion, temperature, and pressure.
- **High School Teacher Internship Program** – The goal of this program is to give high school math and science teachers real-world experience to be able to take back to the classroom and share with their students.

**Supported Programs:**
- Project Fibonacci STEAM Youth Conference
- Central New York Hackathon
- Department of Defense Math Games

**Metrics:**
- Over 1,000 students impacted per year
- 50-100 teachers impacted per year
- Over 700 volunteer hours per year

**Rome Research Site:** Rome, NY POC: Jeff DeMatteis, Phone: 315.330.7132, Email:  rrs.stem.outreach@us.af.mil
STEM program support in the Scott AFB area has changed the lives for many students and teachers, inspiring those who would have never considered STEM activities as a career. Many students decide to concentrate their high school and later college studies in STEM career fields. Teachers are re-energized and bring their rekindled enthusiasm for STEM activities to their classrooms and beyond.

**FUSION:** Provided by the Illinois Math and Science Academy (IMSA) to four area schools, FUSION brings STEM emphasis to after-school programs serving 4th–8th grade students. IMSA also offers engaging summer camp programs at a local elementary school and local university to include such topics as how plants and insects survive in a world dominated by humans, medical practices, and forensic investigation.

**Southern Illinois FIRST:** Provides program support and runs tournaments for local FIRST teams. Teams participate in programs both during and after school. Southern Illinois FIRST support helps provide interaction between students, teachers and administrators in public and private schools and school districts throughout the entire region. These programs enhance the teams’ abilities to conduct research, enhance their problem-solving skills, and use their imaginations. Students also work side-by-side with science and engineering professionals and other adult mentors, to solve an engineering design problem in an intense and competitive way. The Southern Illinois FIRST empowers teams in the local area to participate in each of these activities.

**8th-Grade Career Fair:** Offered each year by the O’Fallon Chamber of Commerce, the Career Fair has a heavy STEM emphasis. The fair brings career guidance to over 800 students each year. A variety of professionals from the community mentor students on educational and other requirements for each career field. The event is an amazing opportunity for students to meet with actual professionals who are actively working in the career fields of their interest. Many students express desires to change their class schedules after they learn about the educational requirements for their chosen career fields.

**STEM Camps:** Four local schools team up to provide BMX, Robotics, Aviation and CyberPatriot camps. Students assemble BMX bikes and determine effect of air pressure and other dynamics. Aviation camp participants culminate their learning by actually flying an aircraft! Teachers are working with a professor in California having students launch helium balloons to the edge of space, monitoring cosmic rays in the atmosphere, and stress-testing Mars microbes with biological radiation sensors. Teams throughout the U.S. will compare research findings of radiation levels during the solar eclipse in August 2017.

**Other Scott AFB STEAM Activities:**
- Mad Science and STEM night programs at multiple schools
- Tying math to sculptor’s models – the resulting sculpture is enjoyed by the entire school community!
- Exploring Newton’s 2nd Law of Motion through go-kart racing
- Combining math/science/art through Da Vinci’s drawings using a Golden Ratio program

**Scott AFB:** St. Clair County, IL POC: Dr. Donna Senft, Phone: 618.229.4825, Email: donna.senft@us.af.mil
Team Tinker’s STEM mission includes the entire state of Oklahoma in establishing mentorships, speakers, and classroom enhancement resources. Additionally, building a foundation for future workforce needs to support the DoD’s mission – Excellence In All We Do – Plant the seeds early, Cultivate, Educate = Growth.

Tinker Air Force Base is the largest single-site employer in the State of Oklahoma—with more than 28,000 employees, over 1700 Scientists and Engineers. Tinker provides a $3B impact to the local economy.

Tinker AFB is unique to the Air Force in having two runways, which allows planes to land and take off when the wind comes sweeping down the plains. Additionally, it has two of the largest infrastructures within DoD—Bldg 3001 is approx. 1.8M square feet and the acquisition of a former General Motors plant aka Bldg 9001, netted the base an additional 2.5M square feet.

Our workload is growing, and we need more STEM career-minded employees, both as new weapon systems come on board, and to sustain older weapons systems. Tinker AFB is also the engine “Mecca” of the world.

**STARBASE Tinker AFB:** funded through Air National Guard—partners with Tinker’s 72 ABW Youth Center. Engages local 5th-grade students through inquiry-based curriculum with hands-on activities and lessons, FY16 impacts: 3 school districts; 14 schools, 42 classes, 994 students impacted

**STARBASE 2.0:** 3 after school programs for 6th- and 7th-grade students—Tinker provides engineer/scientist mentors

**FIRST (For Inspiration and Recognition of Science and Technology) – FRC (First Robotics Competition):** FY16: 47 DoD STEM grants awarded for $94K—each team received $2000 toward registration fees; FY17: 51 DoD STEM grants awarded for $76.5K—each team received $1500 toward registration fees

**OEIP – Oklahoma Education & Industry Partnership:** more than 100 teachers receive educational materials, visits to the main economic industries and get a stipend for attending along with opportunities for $40K in STEM grants

**National Programs Supported:**
- Botball
- GMIS – Great Minds in STEM
- SWE Mentors
- FIRST – 200+ OK Teams
- MATHCOUNTS
- Future City – OKC – Judging
- Science Olympiad

**Local Opportunities:**
- Advisory Boards
- Dress For Success
- Hands-on Demos
- Science Fair Judges
- STEM Panel Discussion Participants
- Boy Scout Programs
- Engineer for a Day
- OK Governor’s STEM Summit
- Summer STEM Camp Tours
- OEIP (Oklahoma Education & Industry Partnership)
- Career Days
- Guest Speakers
- Tinker Tours
- Tutoring

Tinker AFB: Oklahoma City, OK POC: Cynthia Kennedy, Phone: 405.734.9559, Email: cynthia.kennedy@us.af.mil
Tyndall AFB (FL)

Tyndall AFB lies immediately to the south of Panama City, on the Gulf Coast near the middle of the Panhandle. TAFB is an Air Combat Command base that supports a number of tenant organizations, including a detachment of the Air Force Civil Engineer Center, a Primary Supporting Unit of the Air Force Integrated Mission Support Center. The base’s missions include training pilots to fly the F-22.

AFCEC/CX maintains an Educational Partnership Agreement with the public schools of Bay and Gulf counties, whose populations include a large proportion of Title 1 students and of military dependents. The EPA allows the transfer of scientific equipment and supplies to the public schools, notably CC Washington Academy, newly opened in a facility that did not include wet lab facilities; a matching contribution of equipment and supplies enabled the Bay County School Board to acquire and install the facility at right. The EPA also allows technical personnel to volunteer as judges for MathCounts and Science Fair competitions and to contribute to instructional content, and our lab to host hands-on summer internships for high school students, generally juniors, considering STEM programs and careers.

A FIRST LEGO junior program is being piloted this year at Tyndall Elementary School. We sponsor two FIRST LEGO League teams each at TAFB’s Youth & Teen Center, at Everitt Middle School, to which Tyndall Elementary feeds, and at Port St Joe Middle School in Gulf County. The youth center used its LEGO supplies to conduct two well received robotics camps during the summer. We contributed start-up funds to initiate a Girls Who Code program at the Panama City campus of Florida State University.

STEM Scopes packages are being introduced into two classrooms each year. A summer camp to support teacher development is scheduled for 201, and we are providing funds to a new program that allows STEM teachers to design and propose innovations to be funded by their schools from a mini-grant pool, now being tested by Bay’s public school system as a teacher incentive. Also to be piloted during summer 2017 is a two-weekend solar camp at a 70-acre woodland site, for a group of 4th-grade students who will be identified by STEM teachers.

Tyndall AFB: Panama City, FL  POC: Joe Wander, Phone: 850.283.6240, Email: joe.wander@us.af.mil
The United States Air Force Academy STEM Outreach Program mission is to offer a variety of programs that effectively engage, inspire, and attract the next generation of STEM talent through K–12 educational outreach programs. This mission supports the Air Force by engaging non-profit, industry, and academic partners to reach over 30,000 students, teachers, and community members through the following programs:

**Audience with an Astronaut:** Audience with an Astronaut is an annual event hosted by the Academy’s Astronautics Department and the Space Foundation to celebrate World Space Week, an international celebration of science and technology. Students are exposed to a former astronaut and get to learn what it takes to become an explorer.

**STEM Bootcamp:** The Academy teams with a local non-profit to bring a three-day STEM educator boot camp to the Academy each summer. This popular workshop provides teachers with hands-on training in STEM fields, including rocketry, engineering, chemistry, and robotics with over 110 educators in attendance each year.

**Chemistry Magic Show:** The Chemistry Magic Show allows students of all ages to become excited about the wonders of chemistry. The presentation consists of a series of chemical demonstrations (including smoke, fire and color changes) that are used in the classrooms at USAFA.

**Other Programs and Activities:**
- Physics is Phun Show
- Lego Design Challenge
- SeaPerch Design Challenge
- Hour of Code
- Girl Scout Engineering Workshop
- STEM Lending Library
- SAME Camp
- College and Career Fairs
- Laboratory Tours
- Girls in the Middle
- FIRST Leadership Experience
- Civil Air Patrol Summer Encampment
- CyberPatriot
- Science Fair support
- Teacher Workshops
- FIRST Robotics sponsorships and mentorships
- Falcon Physics

**U.S. Air Force Academy:** Colorado Springs, CO POC: Sandy Lamb Phone: 719.333.8990 Email: sandy.lamb.ctr@usafa.edu
The first annual Central Coast Team America Rocketry Challenge (TARC) event was held March 19 at Lompoc High School. The competition intrigues teams to design/build a model rocket to fly 850 feet and back within 43 to 46 seconds, successfully returning two raw eggs as a payload. The qualification launch event was held for a chance to compete as one of 100 teams nationally at Great Meadows in the Plains, VA, in May. Two teams from Vandenberg Middle School and the Vandenberg Air Force Base Civil Air Patrol Squadron were able to launch within specifications to be recorded and sent to TARC. Unfortunately we didn’t break into the top 100 teams, but the students learned so much!

The 31st annual AIAA Central Coast STEM Exposition (formerly Science Fair) was held Friday and Saturday, 13-14 May, once again at the at the Cabrillo High School Gymnasium headquarters for national qualification consideration. We had 164 student participants, 89 total projects judged, and over 40 judges, set-up and preparation volunteers from Vandenberg Air Force Base. It culminated Saturday evening with a presentation of over $575 in cash and $150 in plaque awards and featured speaker, Colonel Todd Schollars, 30th Mission Support Squadron Commander at Vandenberg Air Force Base.

STEM members at Vandenberg AFB are working to develop, design and build the first-ever launch simulation exhibit for the Santa Maria Valley Discovery Museum, focused on capturing the imagination of 3- to 10-year-old students. The exhibit will allow hands-on interaction from students to participate in a mock launch exercise leading up to liftoff of a rocket. An integral part of the process was formulating and coordinating development of an Educational Partnership Agreement between VAFB and the Museum. Part of the EPA includes refurbishment and delivery of a Discovery Space Shuttle model that the children can operate. The exhibit items will leave a lasting impression on school children and open their eyes to the possibilities in the aerospace industry at VAFB. Final delivery is expected in 2017.

Vandenberg AFB: Lompoc, CA POC: Tom Stevens, Phone: 805.605.7008, Email: thomas.stevens@us.af.mil
Wright-Patterson AFB (OH)

Wright-Patterson Air Force Base is located near Dayton, OH and is one of the largest and most important bases in the United States Air Force. The past, present, and future at Wright-Patterson AFB are linked with the Wright Brothers legacy and the Birthplace of Aviation. The base is home to the Air Force Research Laboratory, Air Force Life Cycle Management Center, Air Force Institute of Technology, National Air & Space Intelligence Center, and National Museum of the United States Air Force.

The Wright-Patterson AFB Educational Outreach Office’s mission is to attract, inspire, and develop student awareness and excitement in all fields of STEM, aviation, and aerospace in order to develop our nation’s future scientific and technical workforce to meet future defense technological challenges. The Wright-Patterson AFB EO Office has fourteen K–12 STEM Programs that are hands-on, minds-on to get students engaged and excited about STEM and STEM careers in the local area and state-wide.

**Wizards of Wright! (WOW) Program:** Curriculum based hands-on K–12 science and math demonstrations at local schools. FY16 Impacts: 575 Demonstrations and 11K students Impacted.

**Ohio FIRST LEGO League Program:** Teams research a real-world problem and are challenged to develop a solution. Wright-Patterson AFB EO is the Affiliate Partner for the State of Ohio; FY16 Impact: 500 teams, 30 tournaments, and impacts more than 8K students impacted.

**STARBASE Wright-Patt Program:** Engages local 5th grade students through inquiry-based curriculum with hands-on activities and lessons. FY16 Impacts: 12 School Districts, 33 Schools, 135 classes, 3,400 students impacted.

**Other Wright-Patterson AFB EO Programs and Activities:**
- WOW! On Wheels
- FIRST Robotics Competition
- Job Shadow Day
- AF Science & Engineer Fair Program
- Classroom Speakers Program
- Read Across America
- Tragedy Assistance Program for Survivors (TAPS)
- National Engineers Week
- Dayton Regional Science Festival
- FIRST LEGO League Jr.
- Scanning Electron Microscopes (SEMDS)
- Science Fair Support
- Tutoring/Mentoring
- Teacher Workshops
- STARBASE 2.0
- White House National Week at the Labs
- NCAA First Four STEM Hoopla
- Various Summer Camps….and much more!!


Wright-Patterson AFB: Fairborn, OH POC: Daniel Andrews, Phone: 937.938.4859, Email: daniel.andrews.1@us.af.mil
In support of the Air Force K–12 STEM Outreach Strategic Plan, the Barksdale AFB, Youth Center is currently recruiting elementary, middle and high school age students for their Robotics Teams. Students from 5-18 years may join a team. However, students in grades 3-12 will showcase their skills by competing against other students in their division in the 2016-2017 RARC Competition 2. The circuit includes a total of 3 competitions and the Youth Center plans to compete in RARC 2 & 3. The theme for these competitions is “Powering the Future.” The challenges require teams to learn about energy resources while exploring a newly discovered, uncharted island with their robots. Additional STEM activities will be offered during the event. The competitions are sponsored by the Cyber Innovation Center’s National Integrated Cyber Education Research Center (NICERC), the City of Bossier City, Bossier Parish Schools, Caddo Parish Schools, and Sci-Port: Louisiana’s Science Center.

Altus AFB: Altus, OK POC: Nathan Covington Phone: 580.481.5439 Email: nathan.covingtion.1@us.af.mil

Barksdale AFB: Bossier Parish, LA POC: Sabrina Evans, Phone: 318.456.8400, Email: sabrina.evans.1@us.af.mil
Kadena AFB (Japan)

Okinawa STEM Outreach (OSO) is a group of passionate active duty military members, civilians, local nationals, and teachers who share a common interest in helping educate over 6,000 Department of Defense Education Activity (DoDEA) school students in the areas of STEM. OSO collaborates with all of the different military branches and several local organizations to deliver meaningful and impactful STEM activities to these students. OSO also works with local Okinawan school students to help create a bridge between the American and Japanese cultures through STEM activities. OSO also strives to educate all students on the importance of the STEM disciplines to the United States Air Force mission, and allow students to experience these implements first-hand through our active duty community.

OSO currently supports a CyberPatriot program, and also includes Lego Robotics competitions, SeaPerch demonstrations, SolarCar building and racing, and most recently, a StellarXplorers program.

Kadena AB: Japan POC: MSgt Derek Allar, Email: derek.allar@us.af.mil

Patrick AFB (FL)

The Team Patrick STEM Educational Outreach mission is to increase student and teacher awareness and excitement in all fields of STEM, including Patrick AFB specialties of rocket science, nuclear science, geophysics, chemistry, and meteorology, to help the Nation meet tomorrow’s technological needs to be the world’s greatest Air Force. We leverage the many STEM professionals of the Patrick AFB community to support programs across Brevard County and central Florida. We support Science and Engineering Fairs, classroom and event STEM demonstrations, mentoring, and career days at schools throughout the county. In FY16, Team Patrick activities reached more than 3000 students and teachers at local, regional, and national events.

Patrick AFB: Brevard County, FL POC: Reggie Logan, Phone: 321.494.4733, Email: reginald.logan@us.af.mil
Randolph AFB (TX)

Air Force Personnel Center (AFPC) at Randolph Air Force Base has been participating in national STEM recruiting for the past few years. We have recently initiated a local San Antonio area outreach program and will extend expertise from our scientist and engineering career field team to foster innovation and STEM growth in our local community and national STEM events. STEM growth will enable our Air Force to continue to develop and apply leading technology through the application of science, math, and engineering principles and be a prime enabler in our ability to Fly, Flight and Win and maintain flexibility with airpower.

Randolph AFB: San Antonio, TX POC: Christine Covas-Smith, Phone: 210.565.4228, Email: christine.covassmith@us.af.mil

Vance AFB (OK)

Pictured is the Emerson Middle School Leadership class in Enid Oklahoma. The class has 28 students, and they will be the pioneers of the first STEM program at Emerson. The instructor for the leadership class is 6th grade teacher, Erik Thomas. Melody Shiflet Pankonin is the STEM Coordinator from Vance AFB. Our first project will be building solar cars.

Vance AFB: Enid, OK POC: Melody Shiflet, Phone: 580.213.6285, Email: melody.shiflet@us.af.mil
Luke AFB (AZ)

Luke AFB has recently begun building its STEM outreach program and will see great strides in the coming year. One of our primary partnerships will be with the 24-school Dysart Unified School District. Current projects include “Makerspaces” on K-8 campuses where students work hands-on with technology. The STEM Integrated School at Canyon Ridge is dedicated to the integration of STEM throughout daily instruction and interaction. Shadow Ridge High School hosts engineering and architecture programs allowing students to explore careers in technology, industry and engineering. Beginning in 2017, Surprise Elementary School will provide instruction focused on computer coding and computational thinking using a personalized-learning-based instructional design. Luke AFB is very excited about teaming with these schools!

Luke AFB: Luke, AZ POC: Roxane Dietrich, Phone: 623.856.6550, Email: roxane.dietrich@us.af.mil
The Air Force Diversity and Inclusion Directorate (A1V) is committed to increasing the diversity of the Air Force’s STEM workforce through supporting organizations and participating in events that encourage minorities and women to enter STEM fields. This is accomplished through participating in a combination of national, regional, and local events.

In FY16, A1V supported the following national level events through workshop presentations, hands-on STEM demonstrations (through the Air Force Technical Application Center (AFTAC)), keynote addresses, career fairs and participation at conferences such as:

- Black Engineer of the Year Awards (BEYA) Conference
- National Society of Black Engineers (NSBE) Conference
- USA Science and Engineering Festival
- Society of Asian Scientists and Engineers (SASE) Conference
- American Indian Science and Engineering Society (AISES) Conference
- Black Data Processors Association (BDPA) Conference
- Great Minds in STEM (GMIS) Conference
- STEM Solutions
- Society of Women Engineers (SWE) Conference
- Society of Hispanic Professional Engineers (SHPE) Conference
- STEM/Diversity Expo

In FY16, A1V sought to increase senior leader engagement at large-scale outreach and recruiting events such as NSBE, SHPE, and SWE. To that end, A1V developed Diversity Outreach Immersions (DOIs) that allowed senior leaders to witness first-hand the diverse level of STEM talent that the Air Force is competing for.

Focused outreach on K–12, college and influencers with workshops and hands-on technology centered events. For example, A1V supported 1080 racing competitions, hackathons, science fair competitions, etc. A1V was a major supporter of local and regional organizations such as Patriots Technology which “Empowers Students Through Technology,” while increasing the number of students entering STEM careers.

A1V partnered with Patriots Technology on the YMCA Thingamajig Invention Convention whose attendees include over 4,000 students from local YMCA summer camps.

For more information, visit: [www.af.mil/Diversity.aspx](http://www.af.mil/Diversity.aspx)
One of CAP’s major missions is to promote aerospace education and STEM to its members, cadets and adults, and to schools and STEM organizations. CAP has over 40 curricula products and programs, all relating to STEM. These products cover all ages from pre-kindergarten through 12th grade and beyond. All of our products meet national educational standards, and most of them contain hands-on STEM activities to reinforce learning. Our products reach over 200,000 students and cadets a year, encouraging them to consider STEM careers.

With the financial support of the AF K–12 STEM Outreach Office, CAP developed a STEM Kit program that provides STEM Kits to CAP squadrons, teacher members and AFJROTC instructors to promote STEM in their units and classrooms. Since 2013, CAP has developed eight STEM Kits (astronomy, flight simulator, hydraulic engineering, quad copter, robotics, rockets, remote control aircraft and weather station), reaching over 160,000 kids, at a cost of about $7.00 per student. After having participated in the STEM Kit program, over 75% of the students and cadets have indicated they are now more interested in STEM careers.

CAP also works with the AF K–12 STEM Outreach Office and A1V at the Pentagon, helping reach underrepresented groups (women/minorities) with STEM. CAP participates in AF diversity events held at various AF installations throughout the year. CAP provides mentors/instructors discussing and performing STEM hands-on activities, normally to 200–300 high school students per event. CAP has been involved in approximately 15 events in the past two years.

For more information, visit: [www.gocivilairpatrol.com](http://www.gocivilairpatrol.com)
The mission of AFJROTC is to “Develop citizens of character dedicated to serving their nation and community.” The AFJROTC program is a Title 10, high school Citizenship program that reaches over 120,000 cadets in close to 900 communities across the globe using 1,950 retired officers and non-commissioned officers as instructors. This congressionally mandated program offers a broad array of citizenship, leadership, academic, aviation, STEM, and related co-curricular opportunities for cadets.

The AFJROTC program has 58% minority and 38% female participation. AFJROTC is proud of its diverse and inclusive program, but the program diversity goes beyond ethnicity and gender. The program operates in both inner-city and rural locations. Cadets in every socio-economic status participate and are provided opportunities they would never have without AFJROTC. Program curriculum is developed using 21st Century Learning Theories and AFJROTC is fully accredited by the AdvancED Accreditation Commission. AFJROTC teaches two science courses: Science of Flight and Exploration of Space. AFJROTC also provides a highly acclaimed career exploration course called (LE-300) Leadership Education.

STEM concepts are taught in the AFJROTC classroom and practiced in very popular and critical co-curricular activities. STEM tools like classroom Flight Simulators, Model Rockets, and Remote Controlled (RC) Aircraft have been used for years to enrich learning opportunities and provide immersive learning / experiential learning tools that reinforce what is taught in the classroom.

Given AFJROTC’s size and scope and because STEM is already an important component of what is already taught in AFJROTC, the partnership between AFJROTC and the Air Force K–12 STEM Program hopes to inspire even more of our youth toward these exciting career opportunities and service to the United States.

For more information, visit: www.AFJROTC.com
AF K–12 STEM National Program Partners

The AF K–12 STEM Outreach Program Office is proud to work with these outstanding national STEM programs supporting our nation's youth.

CyberPatriot

CyberPatriot is the National Youth Cyber Education Program. At the center of CyberPatriot is the National Youth Cyber Defense Competition. The competition puts teams of high school and middle school students in the position of newly hired IT professionals tasked with managing the network of a small company. In the rounds of competition, teams are given a set of virtual images that represent operating systems and are tasked with finding cybersecurity vulnerabilities within the images and hardening the system while maintaining critical services in a 6-hour period. Teams compete for the top placement within their state and region, and the top teams in the nation earn all-expenses paid trips to Baltimore, MD, for the National Finals Competition, where they can earn national recognition and scholarship money.

For more information, visit: [www.uscyberpatriot.org](http://www.uscyberpatriot.org)

FIRST

*FIRST (For Inspiration and Recognition of Science and Technology)* was founded in 1989 to inspire young people's interest and participation in science and technology. Based in Manchester, NH, the 501(c)(3) not-for-profit public charity designs accessible, innovative programs that motivate young people to pursue education and career opportunities in STEM while building self-confidence, knowledge, and life skills. *FIRST* participation is proven to encourage students to pursue education and careers in STEM-related fields, inspire them to become leaders and innovators, and enhance their 21st century work-life skills.

For more information, visit: [www.firstinspires.org](http://www.firstinspires.org)
**DoD STARBASE**

DoD STARBASE focuses on elementary students, primarily fifth graders. The goal is to motivate them to explore STEM as they continue their education. The academies serve students that are historically under-represented in STEM. Students who live in inner cities or rural locations, who are socio-economically disadvantaged, who are low academic performers, or who have a disability are in the target group. The program encourages students to set goals and achieve them.

The program engages students through the inquiry-based curriculum with its “hands-on, mind-on” experiential activities. The military volunteers apply abstract principles to real-world situations by leading tours and giving lectures on the use of STEM in different settings and careers.

For more information, visit: [www.dodstarbase.org](http://www.dodstarbase.org)

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**StellarXplorers**

The National High School Space Challenge concluded its Pilot National Deployment in April with the successful crowning of its National Champions. Twenty-seven teams began the qualification with three rounds of competition. The top ten teams traveled to Colorado for the National Finals, visiting the 33rd Space Symposium and completing an additional eight hours of competition. “Sirius Potatoes” from Peninsula High School, Palos Verdes, CA took top honors. Season III began in October with 131 teams registered from 30 states and two overseas locations. Two rounds of qualification will identify the top 30 teams for the semi-finals, and from them, the top ten teams, which will advance to the Finals in April, 2017. Space is a great venue to inspire students to pursue careers in STEM. It is the most multi-disciplinary of human endeavors, incorporating virtually every technical specialty. The Air Force Association is pleased to offer this exciting and engaging program.

For more information, visit: [www.stellarxplorers.org](http://www.stellarxplorers.org)
Junior Science & Humanities Symposium

The JSHS competition is the United States’ premiere showcase for STEM research by high-school students. More than 8,000 students nationwide applied to compete at 46 regional JSHS competitions for the rights to advance to national. Regional JSHS competitions are held at partner universities across the U.S., its territories, and DoDEA Pacific and Europe. The annual national JSHS held in Dayton, Ohio, on April 27–30, 2016, brought in 230 talented researchers from all JSHS regions.

The 3-day event was organized and supported by the U.S Army, Navy, and Air Force, with each service contributing speakers, exhibitors, and researchers through their respective educational outreach programs. Approximately $403,000 in scholarship awards were awarded to about 138 students across 46 regional JSHS competitions and the national competition. Additionally, about $19,000 in teacher awards were presented to a teacher in each of the regional JSHS competition.

My Brothers’ Keeper Week at the Labs

In early 2016, the Air Force Research Laboratory opened the doors at their locations across the country for President Obama’s “My Brothers’ Keeper Week at the Labs” initiative. A key goal of the MBK initiative this year was to connect young people—especially young men of color—to mentoring and support networks, and to instill a passion for STEM.

STEM outreach program leads at the Lab facilities worked with MBK ambassadors from local communities to coordinate this outstanding program. Over 300 children from underrepresented schools took part in half-day programs that included tours, presentations, and hands-on STEM activities.
USA Science & Engineering Festival
The Air Force STEM program supported the USA Science & Engineering Festival, in April 2016, which drew nearly 365K people from all over the United States to Washington D.C. to celebrate STEM at the Walter E. Washington Convention Center. People of all ages were inspired by more than 3000 fun, hands-on activities, more than 30 stage shows, and some of the biggest names in STEM.

As part of the DoD Pavilion, STEM outreach volunteers from the Air Force Research Laboratory hosted numerous hands-on activities for the attendees, as well as providing several presentations on the DoD stage throughout the 3-day event.

Tragedy Assistance Program for Survivors (TAPS)
For the second year, the Air Force STEM program supported the TAPS program held at the Pentagon. The K–12 STEM office from Wright-Patterson AFB, Ohio represented the Air Force, providing several hands-on STEM exhibits for the children, which included activities in robotics and rocketry.

Over 350 family members, including 140 children, were led by Pentagon tour guides and service leadership on an interactive tour of the Pentagon, which included activities and displays provided by each of the Military Service branches.
The Air Force Research Laboratory (AFRL) offers stipend-paid summer internship opportunities to undergraduate and graduate university students pursuing STEM degrees, and to upper-level high school students; select locations also offer internships to university students pursuing education-related degrees and K–12 professional educators. The selected interns gain valuable hands-on experiences working with full-time AFRL scientists and engineers on cutting-edge research and technology and are able to contribute to unique, research-based projects. Graduate interns are able to collaborate with AFRL on current research and incorporate the research into their graduate work.

Benefits:
- Exciting research topics
- Technical training
- Mentorship from experienced AFRL scientists and engineers
- Opportunities to tour AFRL laboratories
- Networking through social events
- Competitive stipend rates

AFRL Locations
For more information on AFRL programs, along with other Air Force internship opportunities, visit: www.afstem.org

For more information on AFRL, visit: www.wpafb.af.mil/AFRL
Science, Mathematics and Research for Transformation Program (SMART)

The DoD recognizes the need to support the education of America’s future scientists and engineers. The SMART Scholarship-for-Service Program is part of a concentrated effort to improve the flow of new, highly skilled technical labor into DoD facilities and agencies and to enhance the technical skills of the workforce already in place. SMART offers scholarships to undergraduate, master’s, and doctoral students who have demonstrated ability and special aptitude for excelling in STEM fields. Students are also provided opportunities to continue their research in civil service roles following graduation.

Through SMART, we are proud to offer our research leaders of tomorrow not only an education, but a career.

For more information, visit: www.smart.asee.org

Palace Acquire

The Science and Engineering PALACE Acquire (S&E PAQ) program enables the Air Force to provide entry-level STEM opportunities to competent, highly qualified individuals outside the Air Force, and to help identify and educate potential future Air Force leaders. Specifically, the S&E PAQ program was established to heighten Air Force STEM’s ability to maintain the leading edge in today’s technology-intensive environment by hiring dynamic, creative, and innovative scientists and engineers.

There are two tiers to this program, based on the level of education of the applicant. One program is designed for recent Bachelor of Science (BS) graduates, and the other targets recent Master of Science (MS) graduates.

We also offer eligible candidates a 25% sign-on bonus and repayment of student loans up to $20,000 for qualifying Federally insured loans.

For more information, visit: www.afstem.afcivilianscareers.com

College Programs Leading to an Air Force Commission

Air Force Reserve Officer Training Corp (AFROTC)

The AFROTC program offers college scholarships to candidates with outstanding academic and leadership qualities. Three- to four-year scholarships are available on a competitive basis to students still in high school or already in college. Recipients receive partial or full tuition as well as a nontaxable monthly stipend. Many colleges offer an additional subsidy for tuition, fees and books to ROTC cadets. To learn more, visit: www.afrotc.com

U.S Air Force Academy

Air Force Academy admissions are extremely competitive. The best time to begin preparing is while still in junior high school. To place yourself a step ahead, you must plan for and achieve top high school academic performance, demonstrate extracurricular leadership and develop peak physical fitness through athletic participation. Applying to the Air Force Academy is an intensive process with many steps, requirements and deadlines. For the most complete information, visit: www.academyadmissions.com
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