

November/December 2021

FAA **BRIEFING** *Safety*



Full **STEAM** *Ahead!*

**Preparing the Aviation
Workforce of Tomorrow**



**Federal Aviation
Administration**

8 When I Grow Up,
... FAA Helps
Students Launch
Aviation Careers

13 A Look at
Non-Flying
Careers

16 Keeping it Real with
Training and Testing



U.S. Department
of Transportation

Federal Aviation Administration

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ABOUT THIS ISSUE ...



The November/December 2021 issue of *FAA Safety Briefing* focuses on the FAA's efforts to inspire our nation's youth, especially young women and those from diverse backgrounds, to pursue aerospace careers and create a consistent pipeline of professionals for a robust workforce of the future. We'll look at the important role science, technology, engineering, arts, and math (STEAM) education plays in this endeavor, and how FAA partnerships with industry, academia, non-profits, and government agencies help to develop STEM/STEAM outreach and educational programs. We will also explore some of the many aerospace career options available and ways you can help introduce others to this exciting and growing industry.

Contact Information

The magazine is available on the internet at:
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Comments or questions should be directed to the staff by:

- **Emailing:** SafetyBriefing@faa.gov
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- **Calling:** (202) 267-1100
- **Tweeting:** @FAASafetyBrief

We also encourage readers to check out the many aviation safety resources available at: FAASafety.gov.

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FAA **BRIEFING** Safety

The FAA Safety Policy Voice of Non-commercial General Aviation



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PIPELINES, PATHWAYS, PARTNERSHIPS



Mission: *Inspire youth from diverse backgrounds to pursue aerospace careers and create a consistent pipeline of professionals for a robust workforce of the future.* — FAA STEM AVSED Action Plan

Greetings! As you might have seen in the September/October issue, Rick Domingo retired from his position as executive director of the FAA Flight Standards Service at the end of September. It is my pleasure to occupy this space in *FAA Safety Briefing* magazine in my capacity as acting executive director. I am especially happy to introduce an issue devoted to a subject very close to my heart: encouraging education in science, technology, engineering, and mathematics (STEM) as a portal to any of the many constantly evolving careers in aviation.

(Note: we'll talk about the "arts" component of the "STEAM" acronym a bit later in this issue.)

Aerospace is a huge field. According to the FAA's January 2020 report on *The Economic Impact of Civil Aviation on the U.S. Economy*, the U.S. aerospace system contributes to more than 5% of the U.S. Gross Domestic Product and accounts for \$1.8 trillion in total economic activity. The industry also supports nearly 11 million jobs. Supporting this critical industry today and as it evolves into the future, while also ensuring the safety and efficiency of the U.S. aerospace system, requires a robust pipeline of future aerospace professionals who have the right skills to meet the 21st century challenges of the aerospace industry.

FAA Outreach

Not surprisingly, the FAA places high priority on doing its part to fill the future aerospace workforce pipeline with diverse and highly skilled individuals. The agency is working closely with partners in industry, academia, non-profits, and other government agencies to develop and implement a robust program to reach as many young people as possible, including those in underrepresented and underserved populations, and address industry needs. The FAA's STEM Aviation and Space Education (AVSED) Program is an essential part of our outreach to the public.

The FAA's STEM AVSED program is not new. First established in 1961, the goal is to conduct outreach and prepare skilled professionals for careers in the aerospace industry. Over the last 60 years, the STEM AVSED program has reached countless numbers of young people through

both formal and informal outreach and partnerships. While its fundamental aims are constant, the specifics of the program have evolved to meet the changing needs of the highly dynamic aviation industry. At this stage, the guiding principles for FAA STEM AVSED engagement include: (1) developing robust pipeline and pathway activities that reach diverse student populations; (2) using partnerships with industry, academia, and government; and (3) ensuring successful internal and external collaboration on these efforts.

Ambassadors for Aviation

You don't have to work for the FAA to contribute to the critical work of introducing young people to aviation. Each and every person with a passion for aviation can help by sharing that enthusiasm with people you know. You can get some specific ideas from information on the FAA website's STEM AVSED page. You might also consider finding ways to help publicize and celebrate National STEM Day on November 8. The possibilities are endless, and the rewards are great. I hope you'll take the time to get involved in this very important cause.

Robert C. (Rico) Carty is Acting Executive Director of the FAA Aviation Safety Organization's Flight Standards Service. Before joining the FAA in 2006, Mr. Carty flew as a captain for a major part 121 U.S. air carrier. His background also includes corporate flying and a distinguished career in the U.S. Air Force as a C-130 and C-141 pilot.

LEARN MORE

FAA STEM AVSED
[faa.gov/education](https://www.faa.gov/education)

AVIATION NEWS ROUNDUP

New SAFO Clears You for Success

In July 2021, the FAA published Safety Alert for Operators (SAFO) 21005, *Risks Associated with Visual Approaches*, which warns airplane operators and pilots of risks associated with visual approaches. While the SAFO's target audience is instrument flight rules (IFR) commercial operators, it provides risk mitigation strategies that all general aviation (GA) pilots can use. The SAFO advises flight crews to:

- Consider requesting an instrument approach to reduce the likelihood of aligning with the wrong runway or a taxiway, and/or exiting controlled airspace.
- Communicate "UNABLE" to ATC when, in the judgment of the pilot-in-command, compliance with a specific instruction, request, or clearance may reduce safety.

You can view or download SAFO 21005 at bit.ly/SAFO21005.

Tips for Speeding Up Your Medical Certification

In the inaugural episode of the *Pilot Minute*, FAA Federal Air Surgeon Dr. Susan Northrup provides simple tips



you can use to streamline the medical certification process. For more information, see the Guide for Aviation Medical Examiners at faa.gov/go/ameguide. The *Pilot Minute* video series is produced by the Civil Aerospace Medical Institute, Medical Education Division. To watch the video, go to youtu.be/sC-C4GwFZ9Q.

Trends in Dangerous Laser Strikes

Shining a laser at an aircraft poses a serious safety threat and can result in large fines and criminal penalties. People who shine lasers at aircraft face FAA fines of up to \$11,000

per violation and up to \$30,800 for multiple laser incidents. The FAA has issued \$600,000 in fines since 2016, which includes \$120,000 in 2021. Violators can also face criminal penalties from federal, state, and local law enforcement agencies.

Working to identify trends in laser strikes, the FAA has developed a visualization tool that analyzes laser strike data from 2010 to 2020.

Using the Tableau software platform, the tool identifies trends that include geographic area, per capita data, and time of day and year. The FAA is sharing the information in the new format to draw attention to the

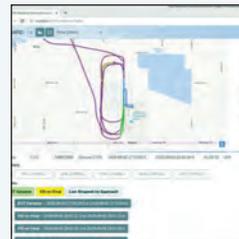
SAFETY ENHANCEMENT TOPICS

Please visit bit.ly/GAFactSheets for more information on these and other topics.



NOVEMBER

Overreliance on Automation — Learn how overreliance on automation technology can inhibit terrain awareness.



DECEMBER

Aircraft Performance Monitoring — A review of best practices for determining and predicting aircraft performance.



dangerously high rate of laser strikes on airplanes.

Laser strikes increased in 2020 despite the decrease in flights due to the COVID-19 public health emergency. Pilots reported 6,852 laser strikes to the FAA last year, up from 6,136 in 2019. The number of incidents reported in 2020 was the highest annual total since 2016. Laser report data by year is available for download on the FAA’s website at [faa.gov/go/lasers](https://www.faa.gov/go/lasers).

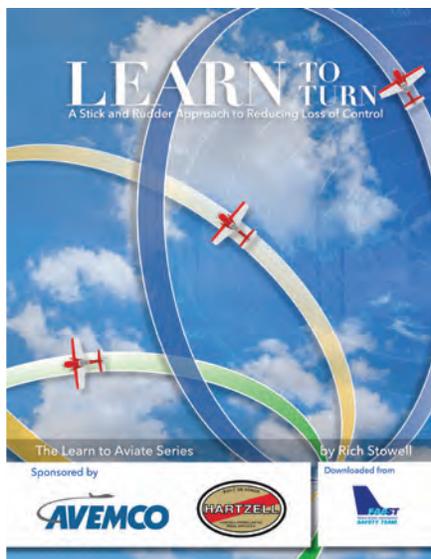
The FAA remains vigilant in raising awareness about the dangers of pointing lasers at aircraft and encourages the public to report laser strikes to the FAA and local law enforcement.

Free “Learn to Turn” Program Available

Master Flight Instructor and 2014 National FAA Safety Team (FAAS-Team) Rep of the Year Rich Stowell recently released “Learn to Turn,” a free program that takes a stick and rudder approach to help reduce the frequency of loss of control accidents. Sponsored by Avemco Insurance Company and Hartzell Propeller Inc., the program is anchored by a 98-page digital booklet. Supporting assets include a 42-page graphics supplement to facilitate classroom discussion, a 28-minute webinar recording, a 12-minute video, targeted training exercises, and a pilot survey.

“Through no fault of their own, light airplane pilots generally have been misinformed and undertrained regarding turn dynamics,” says Stowell, who has more than 30 years of experience providing spin, emergency maneuver, and aerobatic training. “In addition to academic content, ‘Learn to Turn’ offers training exercises designed to improve basic flying skills and increase awareness of the consequences of our control inputs.”

The FAASTeam is among a coalition of thirty early supporters sharing and promoting the content. Pilots, and especially instructors, are encouraged

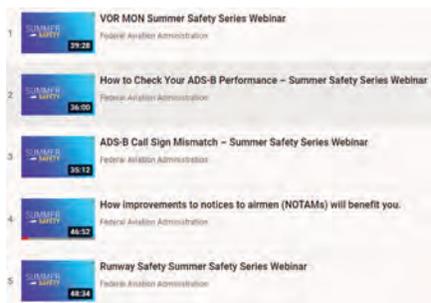


to use “Learn to Turn” to gain more knowledge and experience with all aspects of turning flight. The e-booklet along with all of the program assets can be accessed at communityaviation.com/learn-to-turn. Further, pilots who participate in “Learn to Turn” can qualify for a five percent discount on their annual Avemco insurance premium through the company’s safety rewards program.

Summer Aviation Safety Series

In case you missed it, watch our summer aviation safety playlist on YouTube to learn about NOTAM modernization, navigation tools, safe takeoffs and landings, and how to access critical safety information.

To watch the webinars, go to bit.ly/3x1fwPy.



Next Generation of Sustainable Aircraft Technology

The FAA has awarded more than \$100 million for companies to help

develop technologies that reduce fuel use, emissions, and noise. The award is part of a series of steps President Biden is taking to coordinate leadership and innovation across the federal government, aircraft manufacturers, airlines, fuel producers, and more to position American aviation to soar towards net zero emissions by 2050.

The Continuous Lower Energy, Emissions, and Noise (CLEEN) Program is a public-private partnership that began in 2010 and is a key part of the FAA’s overall strategy to tackle the global challenge of climate change and lower the impact aviation has on communities. The program requires the companies receiving the contracts to match or exceed the FAA’s investment, bringing the total to at least \$200 million over a five-year period. The awards are the third phase of the FAA’s CLEEN program.

Under CLEEN Phase III, the FAA and six industry partners will focus on reducing aviation emissions and noise, including pursuing goals of reducing carbon dioxide (CO2) emissions by improving fuel efficiency by at least 20% below the relevant International Civil Aviation Organization (ICAO) standard; NOx emissions by 70% relative to the most recent ICAO standard; particulate matter emissions below the ICAO standard; and noise by 25 dB cumulative, relative to the FAA Stage 5 standard.

The CLEEN technologies developed so far are estimated to reduce CO2 emissions equivalent to removing 3 million cars from the road by 2050 and to save the aviation industry 36 billion gallons of fuel. The fuel savings is the equivalent of 11.4 million Boeing 737 flights between New York and Los Angeles.

The FAA anticipates that technologies developed under CLEEN Phase III could be introduced into commercial aircraft by 2031.

FAA MEDICAL CERTIFICATION AND ALTERNATIVES

Several years ago, my predecessor penned an article regarding the history of medical certification and an article on the process of certification. As he noted, the fundamental purpose of medical evaluation and certification is safety, yours and the public's.

With this in mind, and with occasional direction from Congress, the FAA developed a set of standards that a pilot must meet to fly. As you might expect, these standards get more stringent as the potential risk to the public increases. A review of the medical certification process and alternatives is now timely.

Some aviation activities, including ultralights, gliders, and balloons, do not require a medical certificate at all. Ultralight pilots, under 14 CFR part 103, do not even need a pilot certificate. Sport pilots can fly with a driver's license. In many states, you are allowed to drive with physical conditions that are incompatible with flight safety. Some of these conditions could contribute to higher fatal and non-fatal accident rates for light-sport aircraft than for the rest of general aviation.

BasicMed provides an alternate path to medical certification, although with limitations compared to a Class III medical. I support this program, as it has made it easier for many pilots to return to the cockpit. I understand the burden the special issuance (waiver) medical certification requirements can place on an individual. In fact, almost 30% of pilots using BasicMed had a special issuance (SI) at their last medical (compared to less than 5% for Class III medical certificate holders). We encourage BasicMed pilots to have frank and open discussions with their treating providers (hopefully the person signing their BasicMed

Comprehensive Medical Examination Checklist (CMEC)) to ensure flight safety and appropriate treatment(s) to remain compatible with flight safety.

The FAA's Office of Aerospace Medicine recently reviewed accident data for pilots flying under BasicMed. While the trend may show a slight increase in mishaps in BasicMed pilots compared to those who maintain a medical certificate, it did not reach statistical significance when comparing the number of accidents under BasicMed and Class III medical certificates. In other words, we cannot determine if this is a real difference or simply due to chance.

We will continue to monitor the trends in all categories of accident data, as we have done for decades. Please remember that changing from medical certification to BasicMed does not cure any underlying condition(s) you may have. We recommend continued follow-up with your personal physician and discussing any underlying health condition with someone knowledgeable in aviation medicine.

Traditionally, the FAA has issued Class I, II, and III medicals. Typically, these are needed for airline, commercial, and private aviation activities, respectively. The standards and duration of these medicals are governed by both your age at the time of the medical, as well as the class of medical requested.

When an individual meets the standards (derived from 14 CFR part 67) for a particular class of medical, Aerospace Medicine issues an unrestricted medical (no time limitations other than the regulatory duration). There are some conditions for which additional information must be provided to your Aviation Medical Examiner



(AME), but these "Conditions AMEs Can Issue (CACI)" also qualify for an unrestricted medical.

In most cases, even when someone does not meet the standards, we can still issue a medical, with either a SODA (statement of demonstrated ability) or SI (special issuance). After an appropriate and successful evaluation, a SODA is issued for a condition that is expected to be stable. An SI, on the other hand, is issued when progression of a symptom or condition is likely and follow-up is required. A SODA generally has no expiration date, while an SI is time-limited.

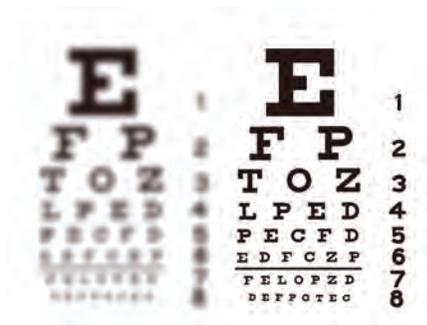
As a reminder, all holders of a pilot certificate under 14 CFR part 61 are subject to the provisions of 14 CFR part 61.53 regardless of whether you require a medical certificate or chose either Sport Pilot or BasicMed.

The medical pathway you choose depends on your own medical history and what type of aircraft you want to fly. There are several paths available, but the end goal to all is safety.

Dr. Susan Northrup received a bachelor's degree in chemistry and a medical degree from The Ohio State University, as well as a master's degree in public health from the University of Texas. She is double board certified by the American Board of Preventive Medicine in Aerospace Medicine and Occupational Medicine. She is a retired U.S. Air Force colonel and a former regional medical director for Delta Air Lines. She is also an active private pilot.



WHAT TO EXPECT FROM AN FAA MEDICAL EXAM



Are you seeking your first FAA medical certificate? Do you have a medical condition that might make it difficult to get certified? If the answer is yes to either question, this article is for you.

As Dr. Northrup notes in this issue's Aeromedical Advisory department, you can fly certain aircraft without holding a medical certificate. These include ultralights, gliders, and balloons. (Note, however, that Congress has mandated that the FAA require commercial balloon operators in commercial aviation maintain a Class II medical certificate.) To fly light-sport aircraft (LSA), you only need a driver's license. For other aircraft, you need an FAA medical certificate. However for BasicMed operations, the airman must have had a FAA Medical Certificate valid for at least one day after July 14, 2006 that wasn't subsequently denied, suspended, revoked, or withdrawn (bit.ly/BasicMedCert).

How To Find an Aviation Medical Examiner (AME)

Most pilots seeking an AME will use their instructor/flight school, pilot acquaintances, advocacy groups, or search online. Go to bit.ly/Find-AnAME and select AME under the "Designee Types" tab.

The FAA authorizes all AMEs to issue Class II and III FAA medical certificates, but Class I medical certificates must be completed by a senior AME. For any class of medical certificate, the AME will review the history and answers you provide on your MedXPress 8500-8 application, your lifetime medical history, including medications, surgery, hospitalizations, and medical conditions (even if now resolved). Review the AME Guide for help (bit.ly/AMEGuide).

Having all your reports in order (complete, legible, and without duplication) is an excellent start.

We also recommend contacting your AME before your appointment to ensure you bring all the necessary documentation. Your AME might even ask you to forward the information prior to your appointment. Note that your AME must transmit the examination to the FAA within 14 days, so it's best to obtain all needed medical records before your appointment.

Typically, you will walk out of your AME's office with a medical certificate in hand. Delays occur when additional information or evaluations are necessary. Sometimes your AME simply needs existing documentation for a CACI (Conditions AMEs Can Issue) condition, for example. If there is a disqualifying or potentially disqualifying condition, a further evaluation might be necessary before the FAA can authorize a medical certificate. If you adequately mitigate the risk from the disqualifying condition, the FAA can issue a special issuance (SI) for conditions that can progress or a statement of demonstrated ability (SODA) for static conditions. For color vision deficiency, we can issue a

letter of evidence if you pass appropriate alternate testing.

The fee for the examination varies based on the region, the examiner, and the class of medical you are seeking. The FAA does not determine the fee. If your case is complicated, such as a CACI, SODA, or SI, there may be an additional charge.

As a reminder, there are ten conditions for which an SI is required, even under BasicMed. This is generally a one-time requirement; however, should the condition change after the issuance of the SI, a new SI might be required. You can find more information at bit.ly/BasicMedFAQs (PDF).

For example, let's say a pilot had a heart attack treated with a stent and was later granted a SI. A new stent, bypass surgery, or another heart attack would require the pilot to obtain a new SI to continue under BasicMed.

The FAA's goal is to authorize as many applicants as possible, and we approve almost 99% of all applicants. Of those applicants that we denied, 95% did not provide the requested information.

If you have any questions, please reach out to your AME. You can also contact your FAA Regional Flight Surgeon's office at (bit.ly/MedCertContacts).

We hope this information will help facilitate your medical certification experience.

Leo M. Hatstrup, M.D., received a bachelor's degree from Wichita State University, a master's in public health from Harvard University, and a doctorate from Vanderbilt University. He is retired from the U.S. Air Force in which he spent the majority of his career in aerospace medicine. He is board certified in aerospace and occupational medicine. He is a certificated flight instructor and enjoys flying airplanes, helicopters, and gliders.

THE AIR UP THERE



A podcast for people who are curious about the wide world of aviation. Join the FAA as we nerd out about the future of flight, drones, and ways to make the National Airspace System safer, smarter, and more efficient. For details on how to listen and subscribe, visit:

faa.gov/podcasts

When I Grow Up, I Want To Be An



How the FAA Helps To Launch Students Into an Aviation Career

By Jennifer Caron



*“If you do what you love,
you’ll never work a day in your life.”
— Marc Anthony*

My dad took me to my first airshow when I was in 4th grade, and that’s when I knew I wanted to be an aviator. I met so many cool pilots, and I got to see neat airplanes and explore in the cockpit. Back then, most of my friends wanted to be superheroes or ballerinas, but not me — sitting right seat was my ultimate thrill ride, and I couldn’t wait to move to the command seat one day. The aviation bug had bitten me from the start, and I’ve been smitten ever since.

There is no doubt in my mind that if my dad had not introduced me to the wonders of aviation early on, I probably would not have developed my “plane” passion that continues to this day. Research confirms it, and studies show that if you have a passion for something now, it more than likely came from an early childhood experience. Ask any of today’s aerospace engineers, pilots, or mechanics, and they can tell you what inspired them to pursue their career in aviation.

For some, it was their natural ability to fix things, taking them apart and putting them back together again — the right way. Others were hooked on math or science and their favorite superheroes were Bill Nye the Science Guy and Stephen Hawking. Still others, who could tell aircraft types just by the sound they made, were always curious to learn the principles of flight and the forces that keep the metal birds in the sky.

Did you know that children are born scientists and mathematicians — testing, exploring, and questioning the world around them? Science, technology, engineering, and math support your child’s instinctive curiosity. These fields of study, also known as STEM subjects, play a critical role in a young aviator’s future. Early exposure to these disciplines prepares students not only for subsequent careers in the aviation and aerospace industries, but also for the workforce of tomorrow.

There are so many opportunities — not just for new pilots, dispatchers, air traffic controllers, maintenance technicians, drone operators, and engineers — but also for cybersecurity specialists, data analysts, program managers, communication specialists, and other professionals who play an essential role in the National Airspace System.

The aviation industry is quickly evolving, but at the same time, baby boomers are retiring in large numbers. Add that to our current shortfall in qualified aviators and mechanics, and you’re looking at a tremendous opportunity for today’s students. That’s the good news. In fact, according to the U.S. Bureau of Labor Statistics, Aerospace Employment is projected to grow 7% from 2019 to 2029 — faster than the average for all occupations. In May 2020, the median annual wage for aerospace employees was \$68,570. The bad news: we’ve got a shortage today that’s projected to shrink the workforce of tomorrow. The demand to fill these STEM-related aerospace fields exists right now, and the need is only growing.

A program the FAA created to address this issue is the STEM Aviation and Space Education (STEM AVSED) Program. It's mission:

- Promote aerospace STEM-based education, and
- Prepare and inspire the next generation for aviation and aerospace careers.

STEM AVSED is a catalyst to encourage elementary, secondary, and college students to study and strengthen STEM skills. Its forward-thinking program introduces students to the educational experience they will need to get those well-paying aerospace jobs that are available and in high demand.

Let's take a closer look at the STEM AVSED Program.

STEM AVSED 101

Since 1935, the FAA and its predecessor organizations have been working with schools and colleges across the nation, and in partnership with other government agencies, industry, and non-profit organizations to promote STEM education. Fast forward to the launch of Sputnik in 1957, signaling the start of the space race. That's when the FAA added space education to the mission, paving the way for the 1961 establishment of the comprehensive program, STEM AVSED, to prepare and inspire students for both aviation and aerospace careers.

National FAA STEM AVSED Program Lead Jim Brough, (whom you'll meet in this issue's FAA Faces department), has worked with the program since 2008, collaborating with the regional STEM AVSED program analysts, FAA employees, and the aerospace community working every day to provide information and quality programs for students and their educators.

The STEM AVSED program has four strategic goals:

- **Pipelines and Pathways to Aerospace Careers:** Perform student outreach to inspire the next generation and provide them with pathways to aerospace careers.
- **STEM Education for Every Student:** Ensure access to our outreach activities for all students, with a focus on underrepresented and underserved communities.
- **Strategic Partnerships to Maximize Benefits:** Collaborate with industry, academia, and other government agencies to develop pipelines into aerospace careers.
- **Cross-agency Collaboration to Optimize the Program:** Making the most of the FAA's internal resources to raise student awareness of opportunities in aviation and aerospace.

The STEM AVSED program reaches thousands of students of every age and grade level nationwide each year. National, regional, and local partnerships with industry, academia, government, and non-profits are the crucial relationships that provide the resources, expertise, and networks to help make this program such a huge success and a champion for students.



Aviation & Space Education

FUN and EDUCATIONAL STEM AVSED PROGRAMS

ACE ACADEMIES

You'll get to spend an entire week at a summer camp learning about aviation ([faa.gov/education/ace_academy](https://www.faa.gov/education/ace_academy)).

- Lessons in flight planning, history, and the physics of flight.
- Field trips to aviation-related sites.
- Instruction on aircraft design and maintenance.
- Flight simulations and aircraft flights.

EAA and many other industry programs also offer aviation camps for middle and high school-aged students (bit.ly/EAAcamps).

MINECRAFT BUILD AN AIRPORT CHALLENGE

In 2020, the FAA created a fun and educational program called Airport Design Challenge. Here are some details about the program:

- Using Minecraft, teams recreated and built local airports using 3D blocks.
- At the end of the contest, FAA staff scored each entry for technical accuracy, creativity, innovation, and demonstrated knowledge.
- Winners received certificates and enjoyed a fun, hands-on way to learn about STEM, teamwork, and problem solving.
- It's free and anyone can join.
- Due to the great response from the public, the FAA is currently reviewing the program and hopes to re-release it in the near future.
- Stay tuned for more on this great program (bit.ly/FAAMinecraft).

Don't miss the General Aviation Manufacturers Association (GAMA) Aviation Design Challenge where high school students can compete to design an aircraft (bit.ly/GAMACHallenge).

Opportunities for Girls? Diverse Students? Youth with Disabilities?

Yes! The FAA is committed to building an aviation workforce of the future that reflects the diversity of our nation, and the STEM AVSED Program is at the forefront of that initiative with “STEM for Every Student.”

Our airspace is evolving, and diversity brings a wide range of life experiences, new ideas, and different perspectives to the table. We’re looking at a future of drones, commercial space, air taxis, and increasingly complex cybersecurity needs. Embracing and cultivating diversity creates an environment open to fresh approaches and innovation to safely enable and address the challenges of our modern airspace. The ability to attract, develop, and retain a qualified, diverse workforce is essential to the FAA’s safety mission.

“It is a well-recognized fact that although aviation and aerospace provide excellent job opportunities for many women and minorities, there is currently a very small percentage in the aviation industry,” says Chris Sharp, manager in the FAA’s Aviation Workforce and Education division. Many lack awareness of aviation and aerospace as a career path.

“STEM AVSED reaches out to and encourages young women and girls, more diverse students, and youth from all walks of life to pursue STEM education and to see themselves in these careers,” says Sharp.

PROGRAMS FOR WOMEN AND MINORITIES

STEM AVSED partners with organizations such as Women in Aviation International, the Organization of Black Aerospace Professionals, and the International Black Aerospace Council, focused on attracting youth to pursue a career in aviation. Close ties to colleges, universities, public school systems, and other organizations with a high concentration of underserved groups assist STEM AVSED in targeting students for inclusion from all minority groups, women, and youth with disabilities.

Federal committees, such as the Women in Aviation Advisory Board and the Youth Access to American Jobs in Aviation Task Force, are tasked to provide recommendations to identify pathways for recruitment and detect barriers to equity and access.

Here’s just a few of the many programs available:

- Women in Aviation International: Education and career resources to encourage and advance women in all aviation fields (wai.org/resources). Check out the *Aviation for Girls* magazine! (bit.ly/WAImagazine)
- Organization of Black Aerospace Professionals: Advancing and enhancing minority participation in aviation. School career day events, summer programs,



flight training academies, professional development (obap.org).

- Fly For The Culture: Making the world of aviation accessible and affordable to all, regardless of race or ethnicity (flyfortheculture.org).

Visit faa.gov/education/partnerships to learn more.

Looking for Grants, Scholarships, FAA Internships?

Check out faa.gov/jobs/students/internships and find the organizations that can help finance your education at (faa.gov/education/grants_and_scholarships).

What Parents and Teachers Need to Know

Educators, counselors, and parents help guide students to future aviation success, and STEM AVSED is here to support you. See page 12 to find aviation-themed curricula, virtual classroom visits, and the newly created Adopt-a-School program.

Virtual and Free

“The unexpected benefit of going all virtual has really opened up the opportunity to expand our reach with larger and much broader audiences — any student can attend from anywhere,” says Sharp.

- This past September, thousands of girls aged 8-17 from around the world participated in the free, seventh Annual Girls in Aviation Day hosted by Women in Aviation International (wai.org/girls-aviation-day-2021). Virtual events included career panel videos, instructional and learning activities, virtual tours, information about scholarships and more, introducing girls to aviation careers and STEM.

- Download the free Aviation for Girls app to view the events and keep up to date with year-round content, including hands-on activities and videos of female role models in the industry (wai.org/aviation-girls-2021-app).



- September also kicked off the FAA's fourth annual, free Aviation Safety STEM career symposium that included guest speakers, interactive visual presentations, STEM engagement activities, and opportunities for middle, high school, and college students to talk with aviation professionals (avsstemcareersymposium.vfairs.com).

- In October, STEM AVSED sponsored a virtual, Girls in Aviation-themed pavilion at the USA Science and Engineering Festival (SciFest) to spotlight aviation careers (usasciencefestival.org).

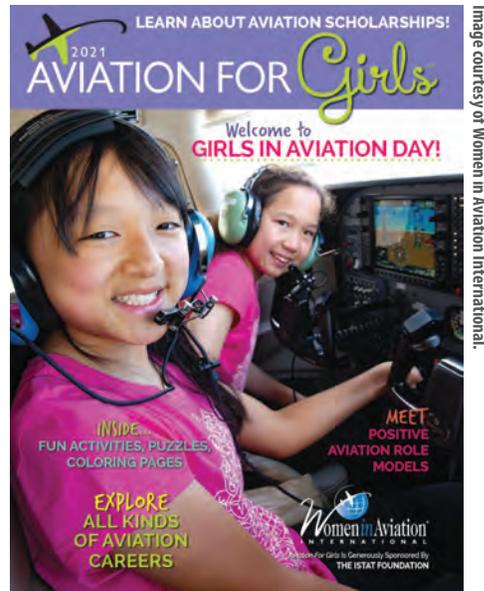


Image courtesy of Women in Aviation International.

Click bit.ly/WAI magazine for the 2021 issue. You'll find all past issues here: wai.org/giad/issues.

The FAA welcomed organizations like Women in Aviation International, the National Air and Space Museum, and Dreams Soar, started by Shaesta Waiz, the first female from Afghanistan certified as a civilian pilot. Read “Meet Shaesta Waiz” in this issue to learn more about her amazing journey and work to empower young women and girls into aviation.

Call To Action

Let this be the moment that inspires a young aviator to pursue STEM and open the doors to a life-long and rewarding career in aviation. As a parent, teacher, friend, or counselor, you are the wind beneath the wings of a student's future flight path.

Share this information with the future aviators in your life — and spread the word!

But don't stop there. There are many intersecting runways to a career in aviation. **Tell us what you're doing to reach the next generation. Reach out by email to 9-AHR-AVSED@faa.gov.**

“When we get the community talking, connecting, and exchanging ideas, the pathways open,” says Sharp. We can set the flight plan for the next generation, as we share our passion with the aviators of tomorrow. ▶

Jennifer Caron is *FAA Safety Briefing's* copy editor and quality assurance lead. She is a certified technical writer-editor in the FAA's Flight Standards Service.

LEARN MORE

Additional Resources for Aviation and Aerospace Education
faa.gov/education/students/resources



Aviation-Themed STEM Lessons and Resources

Check out [faa.gov/education/educators](https://www.faa.gov/education/educators). To find aviation-themed STEM lessons and resources and the K-12 curriculum, check out [faa.gov/education/educators/curriculum/k12](https://www.faa.gov/education/educators/curriculum/k12). For games, puzzles, projects, and fun hands-on experiments for every grade level, visit [faa.gov/education/students/activities](https://www.faa.gov/education/students/activities).

Don't miss the Youth Access to American Jobs in Aviation Task Force public meetings. They're live-streamed, include guest speakers from the aviation community, and anyone can virtually attend. You'll find a YouTube playlist of past meetings at bit.ly/YAAJATF.

Industry programs offer STEM aviation curricula as well:

- 🍏 Check out AOPA's free High School Aviation STEM curriculum for high school teachers (youcanfly.aopa.org).
- 🍏 Discover the Experimental Aircraft Association's (EAA) AeroEducate. It's free, with turnkey aviation-themed activities for teachers of kids aged 5 to 18. EAA also offers free introductory (Young Eagles) flights for students (eaa.org/ea/youth/free-ye-flights).
- 🍏 Choose this site for an aviation maintenance-focused curriculum for students interested in aviation technical training (chooseaerospace.org).
- 🍏 Find fun and interactive FAA aviation and aerospace educational videos on YouTube (bit.ly/AviationAerospaceFAA).

Adopt-a-School

The newly created Adopt-a-School program pairs teachers with FAA Liaisons that come to your school. Initially, the program will work with your schools to teach six aerospace lessons for 4th grade students for free, with lessons and materials on a wide range of STEM-related aerospace topics. The program launched during the 2021-22 school year with nine schools across the country selected, based on a combination of factors including diversity and proximity to FAA facilities. Adopt-a-School provides a unique learning opportunity for students. Stay tuned at [faa.gov/education/students](https://www.faa.gov/education/students) for more on this innovative new program as it grows in future years.

Virtual Classroom Visits

At the heart of STEM AVSED are close to 1,700 FAA employees who train as outreach representatives to share their time, expertise, and passion for aviation with students aged K through 12. Since 2016, the program has tapped into FAA employees and industry partners who are drone pilots, mechanics, engineers, and so much more to cultivate students' love for STEM education and to consider aviation careers. They visit schools, scout programs, community events, etc., (now virtually, due to COVID-19) to serve as online guest presenters, virtual science fair judges, conduct virtual job shadow sessions, introduce fundamental aviation concepts to students, and conduct educator workshops with learning packets for teachers and parents to use at home.

Beyond the Flight Deck

Non-Flying Work in the Aviation World

By James Williams



Time lapse photo of arrivals into Ronald Reagan Washington National Airport (DCA). Flying is only one piece of an elaborate aviation system.



We've all been there. You're at a junction point in your life, maybe after graduating from high school or college, or after a milestone birthday, where you need to either change a career or start one. In the pages of this training and career-focused issue of *FAA Safety Briefing*, we tend to focus on the pilot-centric world. However, aviation is filled with opportunities that don't involve actually piloting an aircraft. We've looked at a few of these career options in the past — see p. 20 of our September/October 2016 issue, "The Airway Less Travelled." Here are a few more options to consider should you desire a non-flying career in aviation.

Keep 'em Flying, Safely

Aircraft are fickle beasts. Their care and feeding is no easy task because they are fundamentally a system of systems. Aviation Maintenance Technicians (AMTs) are required to understand how to repair and keep these systems in good working order. While there are some similarities with the work of automotive technicians, the stakes in the aviation world are much higher since you can't just pull over and wait for the tow truck.

"You need to have a love for aircraft," explains Mike Dunkley, the 2021 National Aviation Technician of the Year. "It's not just doing the work of a mechanic — you can do that on a car. I



Mike Dunkley



know there's a shortage of aviation mechanics in the U.S. today, so we need them, but we need people with a love of aircraft too."

Dunkley emphasizes the need to work with pilots to determine the root cause of maintenance issues due to their highly integrated systems. "I might have a pilot who says, 'I have this problem,' and then digging deeper I discover that there's an associated problem which caused that problem, and that wasn't the original problem anyway." According to Dunkley, the bottom line is to get the full story.

Dunkley has another piece of advice for those currently in or getting into the field of aviation maintenance. "Check it, and check it again. After completing a job, put your inspector's hat on, and look at what you just did," says Dunkley. Ask yourself — "Did I perform the work correctly and in accordance with the appropriate airworthiness standards and maintenance manuals? Yes, it may take a little longer, but you're going to be satisfied with the work, and it's going to be a safe product by the time you release that airplane back into flying status again," he explains. For more information on becoming an AMT, visit faa.gov/mechanics/become.

Command the Sky

"I had never even considered a job as an air traffic controller," says Sarah Patten, Air Traffic Control Specialist at the FAA's Potomac Consolidated Terminal Radar Approach Control (TRACON). Patten started her aviation career as a pilot and flight instructor, but in 2008 she was convinced to apply for an FAA job as an air traffic controller (ATC). "I'm so glad I took a chance and applied," Patten explains. "The job has been so interesting, and I've had some incredible opportunities along the way."



Sarah Patten. Sarah is also a pilot, in addition to working as an air traffic controller, so she knows what it's like to be on both sides of the mic.



Potomac TRACON handles air traffic control services for the Baltimore-Washington, D.C. and Richmond-Charlottesville, Virginia regions. “The increased security of the airspace can be a bit intimidating to pilots, but once you know how it works, it’s really not that scary,” says Patten. She uses her pilot and instructor skills to help fellow pilots navigate that complex and restricted airspace. She also participates in Potomac TRACON’s Operation Raincheck (when available), which allows pilots to learn how ATC works from the controller’s side.

If you are interested in becoming an Air Traffic Control Specialist, visit [faa.gov/jobs/career_fields/aviation_careers](https://www.faa.gov/jobs/career_fields/aviation_careers).

With change comes opportunity and right now there’s a lot of change in aviation.

And Now for Something Completely Different

Well, not exactly, but here’s something far less defined than the previous entries. With change comes opportunity and right now there’s a lot of change in aviation. This fact is especially applicable to the introduction of Unmanned Aircraft Systems (UAS) Traffic Management (UTM). There’s a tremendous fervor around how UAS can be used to revolutionize aviation. But the key to that revolution is UTM — how to safely get those new operators into the National Airspace System (NAS). So if you like solving complex problems, then UTM might be for you.

“I used to be an air traffic controller at San Francisco International Airport (SFO), and by early 2017, I was hearing a lot about drones as the FAA rolled out the Low Altitude Authorization and Notification Capability (LAANC),” says FAA UTM Implementation Program Manager Peter Sachs. “We got several requests at SFO from people wanting to fly drones near the airport, but we didn’t



Peter Sachs



NASA Image.

A concept image provided by NASA of a fully developed UTM system.

have good tools at the time, other than our own judgment, to decide what was safe. That’s when I learned about the UTM concept. I realized I could contribute to it since I had a lot of background knowledge, not just from working air traffic, but also from being a flight instructor, and understanding some of the FAA’s systems like the Standard Terminal Automation Replacement System (STARS) radar and the electronic flight strip prototypes.”

UTM is full of unsolved problems, and I’ve come to relish working in a space where we don’t have all the answers yet, let alone how to make them a reality,” says Sachs. “The work we’re doing now, whether technical or regulatory, will shape future systems in 10, 20, even 30 years’ time, and probably in ways we can’t quite fathom. That makes it a really fun set of challenges for me.”

When asked what advice he would have for someone interested in UTM, Sachs explains that much of what you need to know can be learned on the job. “This is an emerging and quickly growing field, so if you don’t know the answer, it’s possible that no one else does either. That’s an opportunity for you to find a new approach.” Sachs continues, “I went to school for sociology and journalism and took flying lessons in my free time. Everything else, including everything I do that counts as — ‘systems engineering,’ are skills I picked up along the way. You also don’t need to be a software engineer or a coder, although learning how to talk to those teams is certainly helpful,” Sachs explains. He believes the most essential qualification is a desire to keep learning, and lots of curiosity.

As you can see, there are several career paths that exist beyond the bounds of the flight deck. You have options that let you join the aviation world with or without a pilot certificate — so take a look! ▶

James Williams is *FAA Safety Briefing’s* associate editor and photo editor. He is also a pilot and ground instructor.

Picking Up **STEAM**

How FAA-Industry Collaboration Keeps Training Real

By Susan K. Parson



One of the many clichés batted about in the flying world is that a new aviation certificate or rating is a “license to learn.” It is true that the achievement is a starting point, and it is also true that we should always be learning. Still, I was shocked by how many times my private pilot ground school instructor emphasized some point, but immediately assured us that we didn’t need to recall it for long. Rather, we could just memorize whatever it was and, “because you don’t *really* need that,” we could forget it as soon as we had successfully passed “the written” (aka the knowledge test) and/or the oral portion of the practical test. Huh?!

Two subsequent events reinforced both my instructor’s well-meaning assurance and my budding outrage about devoting time and effort to irrelevant material. The first was my experience in taking the knowledge test. Even as I dutifully churned through the multi-step process required to answer a particular question, I thought it was ridiculous. The overly complex question required me first to pore over several badly rendered weather charts and use that information to perform multiple interpolations across several performance charts. The result of these careful calculations was a two — yes, two (!) — knot wind difference. Adding insult to injury was the fact that the calculations were for an altitude I could not possibly reach in a GA airplane.

The second reinforcing event came when I was introduced to the automatic direction finder (ADF), an airborne navigation instrument now vanishing as quickly as the ground-based non-directional beacons (NDB) that supported it. Ground school drills, practice exams, and the actual “written” test were chock full of questions requiring

use of the $MB = MH + RB$ formula for the fixed-card ADF. I didn’t quite believe the ground school instructor’s “you won’t really need this” assurance until I saw for myself that (a) fixed card ADF instruments were already mostly extinct, and (b) determining the bearing to or from an NDB didn’t require mental math.

So, you could say I had lots of objections to the “the written” as it was constructed.

A Decade of Progress

It seems I had plenty of company. When the opportunity arose in 2011 for the FAA to team up with experts in the aviation community to address this problem, there was no shortage of eager volunteers. Since then, the FAA has worked with several diverse and highly qualified groups of aviation industry experts to find a better way. The team includes advocacy groups, instructor organizations, academia, courseware providers, manufacturers, part 61, 121, 141, and 142 training providers, and some very knowledgeable individuals, along with FAA employees from a variety of specialties and policy divisions.

The first results of this ongoing effort — the Airman Certification Standards (ACS) for the Private Pilot-Airplane certificate and the Instrument Rating for airplane — replaced the corresponding Practical Test Standards (PTS) documents in June 2016. Several additional PTS-to-ACS transitions have been published since then, and still more are in queue for release. For those new to aviation, the ACS is fundamentally an enhanced version of the PTS. It adds task-specific knowledge and risk management elements to each PTS Area of Operation and Task. The result



Trailblazer, Mentor, and a Global Inspiration for Women in Aviation

By Tom Hoffmann



All photos courtesy of Dreams Soar, Inc.

There is a small, but elite group of aviators who have earned their membership in the “earth-rounders” club by flying around the world in a light aircraft. This group, which includes the likes of Wiley Post, Amelia Earhart, and Dick Rutan, gained some esteemed company in 2017 when then 30 year-old Shaesta Waiz completed her round-the-world flight in a Beechcraft *Bonanza*, duly dubbed the *Dream Catcher*. In addition to this amazing feat of flying that spanned 145 days, 22 countries, and nearly 25,000 nautical miles, her accomplishment comes with some important distinctions that put her in some truly rarified air.

Shaesta’s record-breaking round-the-world flight spanned 145 days, 22 countries, and nearly 25,000 nautical miles.

First, Shaesta became the youngest female pilot in history to fly solo around the world in a single-engine aircraft. (Note — at the time of this writing, Belgian teen Zara Rutherford is hot on her heels in pursuit of this record.) Shaesta also accomplished her historic flight as the first female civilian certificated pilot from Afghanistan, becoming a critical beacon of inspiration to the millions of women in her native country who aspire to have careers in the science, technology, engineering, and math (STEM) fields. Superlatives aside, it was her educational outreach role that

Shaesta considered to be the most notable and important part of her around-the-world trip. Emboldened by her ability to make a lasting impression on thousands of youth, this leg of her journey continues to this day.

A Dream was Born

Shaesta wasn’t always crazy about flying. After fleeing Afghanistan with her family in 1987, Shaesta grew up in Richmond, Calif., with her parents and five sisters. She had little to no exposure to aviation, except for the news or occasional airline disaster show on television, which ironically fomented a fear of flying. It wasn’t until a commercial flight at age 18 during a family vacation to Florida when everything changed. The formative and freeing experience of flight gave Shaesta an instant sense of belonging, which for years she had struggled to come to terms with. “I was always too American to be truly Afghani, and too Afghani to be truly American,” she explains. But after the flight, she found a place where she could claim her true identity: her mind was set on becoming a pilot.

While earning her pilot certificates and pursuing a degree at Embry Riddle Aeronautical University (ERAU), Shaesta’s career path in aviation began taking shape. But instead of pursuing an airline or military flying job, Shaesta decided her true passion was helping to inspire other people discover their own passions — particularly those who, like her, remain vastly underrepresented in the aviation industry.

“I realized that I needed to do something with my story,” says Shaesta, reflecting on her family’s refugee experience



AFGHANISTAN



CANADA

Shaesta interacted with more than 3,000 youth in 22 countries during her round-the-world trip.

and growing up as a minority female in an underprivileged city. “More importantly, I wanted to talk to young kids about believing in themselves, taking a leap of faith, and going after things they are passionate about.”

She started with the Women’s Ambassador Program, an initiative that helps mentor and support young women pursuing an education in aviation and engineering. Her efforts soon shifted to a more global scale. After meeting Barrington Irving, a Jamaican-born pilot and fellow earth-rounder, she got the idea of doing a round-the-world flight to expand her outreach platform.

“It wasn’t my mission to set any kind of world record,” says Shaesta, who admits not even knowing who held the record before her. Instead, her goal was to reach as many children in as many countries as she could to help spread her “Yes, you can fly!” message. To help facilitate these efforts and gain support for her flight, she founded Dreams Soar (dreamssoar.org), a non-profit organization dedicated to sharing and promoting the importance of STEM education for girls and young women.

Let the Flight Begin

After several years of planning, Shaesta’s round-the-world trip finally took flight in May 2017 with 30 stops strategically selected to maximize STEM outreach. With the help of sponsors, local ground support, and various civil aviation authorities (including the FAA), Shaesta was able to inspire and visit with more than 3,000 children during the trip. Highlights included a stop in her native Afghanistan to discuss STEM opportunities with its former president and an incredibly warm welcome in Egypt where authorities arranged for an all-female crew of air traffic controllers to handle her flight. “I was really blown away by the hospitality I received,” said Shaesta. “It was simply incredible.”

Shaesta also made sure to take time during the flight to reflect on the personal significance of her voyage. She remarks that when reaching the “point of no return” over the Atlantic Ocean, pride washed over her when she realized that only seven other women had crossed this ocean solo in a general aviation aircraft. “It felt special that this was something I uniquely shared with someone like Amelia Earhart.”

Of course, with a trip as long and complicated as this, things are bound to go awry. Shaesta had her share of challenges along the way, including mechanical issues, unexpected weather, and a rather frustrating bout of head lice towards the end. On the longest and most stressful leg of the flight, from Honolulu to Hayward, Calif., an extra one-knot of headwind forced her to turn around three hours into the flight. Shaesta was understandably frustrated, but proud of her decision to call out mission creep when she saw it, especially in light of the razor thin safety margins for this leg of her flight.

Coming Full Circle

On her next attempt at reaching the California shore, she encountered unavoidable dense fog. Despite feeling fatigued, Shaesta remained laser-focused on her instruments, wondering at times if she was even moving. “When I finally heard ATC’s voice on the radio, it sounded like opera!” she exclaimed. Her arrival into Hayward was all the more rewarding given it was just a stone’s throw from her Bay Area hometown. “It sounds cheesy, but at that moment, it dawned on me that you really can achieve anything you set your mind to.”





FIJI



INDIA

Shaesta interacted with more than 3,000 youth in 22 countries during her round-the-world trip.

That sense of accomplishment is the very thing Shaesta worked hard to instill in the minds of youth during her flight. It didn't take long to see the fruits of her labor, either. Thanks to Shaesta's inspiration, a young woman she encountered in Spain immediately began flight training to pursue her dream of flying. Over the years, Shaesta has watched her blossom from a student pilot to a now gainfully employed commercial pilot.

From STEM to Stern

Since her historic flight, Shaesta has continued her work with Dreams Soar, promoting STEM outreach to nine additional countries and hosting another 30 outreach events to a total of 12,000 children. Going forward, Shaesta is excited about inspiring the next generation of aviators by focusing the organization on three main pillars: outreach, scholarships, and innovation. Dreams Soar presented its first flight training scholarship in 2019 to a woman at ERAU and hopes to provide more.

Shaesta decided her true passion was helping to inspire other people discover their own passions — particularly those who, like her, remain vastly underrepresented in the aviation industry.

Her educational outreach activities have also received the attention of the FAA, who made Shaesta an official STEM ambassador for the agency in 2020. "The FAA has always been very supportive of my activities, including the round-the-world flight," said Shaesta. "Since we were doing a lot of the same work in terms of engagement and outreach, it just made sense to collaborate efforts."

This new symbiotic relationship allows Shaesta to showcase the work of Dreams Soar at different events, while also helping people understand the FAA's organizational values and safety mission. Shaesta collaborated with the FAA on one such event — the USA Science and Engineering Festival (SciFest) this past October, where she helped support a Girls in Aviation themed pavilion.

In and On the Air

At EAA's Airventure 2021, Shaesta launched another new and exciting outreach platform — her *AVIATE with Shaesta* podcast, which brings together female aviators to have open and honest conversations about what it means to be a woman in aviation. Discussion topics have spanned everything from balancing motherhood and flying, to dealing with social media pressures, to mental health issues. Shaesta is pleased with the podcast's success thus far, including its ability to attract many international listeners. She plans to wrap up season one with a celebration event at the National Business Aviation Association's annual conference in October and begin the planning process for season two in 2022.

To augment her podcast, Shaesta also launched an app that she based on building a community for female aviators. "What if there is an aspiring aviator who wants to be a pilot, but has questions about motherhood? Who does she turn to?" asks Shaesta. The idea is to continue the important conversations she has with podcast guests in a more intimate setting on the app. Shaesta hopes to be able to host live discussions on the app as well with herself or other experts. Find out more about the app and catch up on all the podcast episodes here: aviatewithshaesta.com.

Embracing the Future

On a more personal note, Shaesta has focused much of her energy in recent years on starting a family and maintaining a residence overseas, leaving her little time for personal flying. She aims to get back to more regular flying with aspirations of some future glider and aerobatic training. "I also like the idea of teaching," says Shaesta, "I feel like the perspectives I've gained would be fun to impart." No matter what, Shaesta says flying will always be a part of her identity.

That same belief goes to the core of her outreach messaging. "You need to embrace who you are and embrace your challenges," says Shaesta. "You might not see people like you in aviation — but that's a cue that you're needed. The aviation community is an incredible community to be a part of, and we need more people that look different to be a part of it so that it is more diverse and inclusive."

As for ways that you, the GA community, can help inspire interest in aviation and STEM careers, Shaesta



SINGAPORE



SRI LANKA

Shaesta interacted with more than 3,000 youth in 22 countries during her round-the-world trip.

offers that engagement is essential. “Keep showing up, keep sharing your stories, keep inspiring. Whether you think it might help or not, at one point in a youth’s journey to becoming a pilot, they’re going to remember the people who were there contributing their time. It just takes one person to inspire another, so any contribution you can make is going to have an impact on the bigger picture.”

In line with her own advice, Shaesta has magnanimously offered counsel to 19-year old Zara Rutherford, who is currently on her way to beating Shaesta’s record as the youngest female to solo around the globe (*read about Zara’s flight at flyzolo.com*). “I wished her safety and success, and to go out there and show the world that women are capable of doing great things.”

Terrific advice for Zara, as well as for future generations of young aviators! ▶

Tom Hoffmann is the managing editor of *FAA Safety Briefing* magazine. He is a commercial pilot and holds an Airframe and Powerplant mechanic certificate.

LEARN MORE

Dream Soar video
bit.ly/DreamsSoarVideo

A Passion for Aviation video
bit.ly/AviationPassion





Small Props for **BIG** CHANGE

Dive into Drone Jobs

By Paul Cianciolo

Opportunities to take to the skies are more abundant today than ever before in human history. You don't even need to leave the ground to fly anymore. With nearly one million drones registered, opportunities to either professionally pilot, or work on unmanned aircraft systems (UAS) or drones, are ripe for the taking.

If you are interested in expanding your remote flying skills, or want to encourage a future aviator into a career working with drones, then read on.

It All Starts With TRUST

Do you know what it takes to fly a drone? Find out by taking The Recreational UAS Safety Test (TRUST). It's free, and you can't fail it. TRUST is also required if you want to fly a drone for fun.

If you want to go beyond recreational flying and become a pro, then you will need a Remote Pilot certificate to fly a drone under 55 pounds. This is commonly called a "Part 107 Certificate" because the rules are outlined under 14 CFR part 107. These rules cover any small drone flying for any non-recreational purpose. The *sky's the limit* as long as you are following the rules.

Use Your Skills Where You Work

Many companies and organizations are using drones as tools to get a job done more efficiently and safely. Fire-fighters can get a bird's eye view to understand where to send resources during an emergency. Police can keep an eye from above to keep the public safe. Utilities can inspect wind turbines, pipelines, and power lines. Farmers can





inspect crops and spray for pests. Rescuers can use sensors to save lives. Real estate agents can show buyers more angles to sell a property. Insurance adjusters can better examine property damage from a distance and in less time. Cinematographers can capture unique shots. And retailers can deliver products more precisely.

There are many more uses, but you get the picture. There may even be a use for a drone operation where you work.

Go Drone or Go Home

For those trying to figure out what to study in college, there are now direct vectors right into the world of drones. Many universities are now offering bachelor's and master's degrees in drone operations. Additionally, STEM education careers from K-12 and higher are in demand.

You don't need a drone degree, though, to work for a drone company or teach students. The drone industry is bursting with opportunity. New companies specializing in drone operations, development, manufacturing, and design are spreading across the country.

There is more to the drone industry than just flying. The Association for Unmanned Vehicle Systems International (AUVSI) is one place to look for these types of jobs. Positions range from engineering (software, mechanical, electrical, Java, etc.) to project management, business development, geographic information systems (GIS), research, aviation safety, and sales. Go to auvsi.org or your favorite job search website to take a look at opportunities available today.

The Prop Tip

The drone industry grows every day. One last tip in order to stand out in the crowd — record your hours/experience. Even if you are just starting out with some recreational flying, keep a log. Record the time you spend at the controls, the type of flying you are doing, and any training you take. Just like traditional aviation, your logbook (paper or electronic) is your best resume. Your drone log could just be the key to convincing your company to let you fly a drone for them or get that job in the drone industry. In addition to documenting your experience, a log can show that you are serious about a drone career. ▶

Paul Cianciolo is an associate editor and the social media lead for *FAA Safety Briefing*. He is a U.S. Air Force veteran, and an auxiliary airman with Civil Air Patrol.

LEARN MORE

TRUST
bit.ly/FAATRUST

Part 107 Remote Pilot
bit.ly/UASComm

Drones for Educational Users
bit.ly/UASEd

AUVSI Job Search
auvsi.org



OPTIMIZING OPTIONS AND OPPORTUNITIES

“Mentoring is a brain to pick, an ear to listen, and a push in the right direction.”
— John Crosby

Aviation is a big world. Even for those who have a sharply focused aviation goal, it’s not always easy to navigate the many avenues to aviation. There is great value in having a mentor to help illuminate the many pathways and possibilities. Like the original Mentor, a character in *The Odyssey*, a modern-day mentor is a trusted advisor who provides one-to-one support, encouragement, and advice.

IF YOU DON’T KNOW WHERE OR HOW TO START WITH ENCOURAGING STEM EDUCATION AS A PATHWAY TO AVIATION, THE FAA’S STEM AVIATION AND SPACE EDUCATION (AVSED) PROGRAM OFFERS SUPPORT.

One of the mentor’s most important functions is to share experience and insights that can help a less-experienced colleague learn faster and make fewer mistakes along the way. If you are an experienced pilot, you can contribute by being a mentor to others. As Khalil Gibran offers in *The Prophet*: the teacher/mentor “gives not of his wisdom, but rather of his faith and his lovingness ... If he is indeed wise, he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind.” By offering a sounding board, a fresh perspective, and simple encouragement to help build confidence, the mentor can play a vital role in helping someone discern their own pathways.

Mentoring certainly involves sharing your own experience and ideas. But if you don’t quite know where or how to start with encouraging science, technology, engineering, and math (STEM) education as a pathway to aviation, the FAA’s STEM Aviation and Space Education (AVSED) program offers support — both directly to educators and students, but also to those who want some ideas for mentoring.

One of the most important things you can convey is that aviation career opportunities go far beyond piloting an aircraft or a drone. STEM education can provide the foundation for a wide range of aviation job options, such as:

- Air Traffic Control Specialist — promote airplane safety by directing the movement of air traffic
- Electrician — install, maintain, and repair aircraft electrical systems
- Engineer — design and develop aircraft and related aviation/aerospace technologies
- Flight Attendant — travel the world and ensure the safety and comfort of airplane passengers
- Ground Crew Member — support many aspects of the aircraft while it’s on the runway
- Mechanic — inspect, diagnose, and repair aircraft
- Pilot — fly aircraft (including drones) for pleasure, recreation, or career
- Safety Inspector — develop and administer aircraft safety standards
- Sales and Service Representative — assist airline passengers with flight travel details



Aviation & Space Education

- Technical Operations Specialist — manage various technical aspects of aircraft operations

For curriculum and activity resources, the AVSED site’s K-12 curriculum (link below) includes ideas and examples of various aviation-themed lessons, which can serve as a guide and resource for educators, parents, and mentors. These lessons and activities introduce students to STEM using aviation-based topics.

Along with its partners, the FAA is proud to offer the STEM AVSED program to students and educators worldwide. Join us in using STEM to help prepare and inspire the next generation of skilled professionals for aviation and aerospace careers!

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing* and a Special Assistant in the FAA’s Flight Standards Service. She is a general aviation pilot and flight instructor.

LEARN MORE

FAA STEM AVSED
[faa.gov/education/about](https://www.faa.gov/education/about)

AVSED Virtual Learning
[faa.gov/education/virtual_learning](https://www.faa.gov/education/virtual_learning)

AVSED K-12 Curriculum
[faa.gov/education/educators/curriculum/k12](https://www.faa.gov/education/educators/curriculum/k12)

Aviation Career Academy (ACE)
[faa.gov/education/ace_academy](https://www.faa.gov/education/ace_academy)

Aviation & Aerospace Resources
[faa.gov/education/students/resources](https://www.faa.gov/education/students/resources)

STEM AND UAS EDUCATION

The concept and development of science, technology, engineering, and math (STEM) education has a long history in the United States, and its importance continues to the present day.

Unlike with traditional aircraft, drones offer fewer barriers into aviation which increases the reach to historically excluded communities, women, and people with disabilities. For students in middle and high school, drones open many doors to career opportunities from piloting to engineering to filmography.

The drone industry is the fastest growing segment in aviation, and drones are truly an equalizer for students interested in aviation. Operating a drone is relatively inexpensive, exciting, and a fun hobby that can easily serve as an entry point to engage in STEM activities and future careers.

Drones also play an important role in fostering curiosity, creativity, and analytical thinking. Establishing

these characteristics at an early age, when young minds are excited about learning, imparts lifelong critical thinking skills.

The FAA's STEM Aviation and Space Education (AVSED) Program has taken a strategic approach in reaching out to schools: through engagement, providing resources, and implementing STEM-aviation programs such as Adopt-a-School. This year, drones were included in the STEM AVSED lessons.

Industry, academia, as well as local, state, and tribal governments, have partnered with the FAA's BEYOND and the Alliance for System Safety of UAS (ASSURE) programs to encourage STEM education.

In 2020, the FAA launched the UAS Collegiate Training Initiative (UAS-CTI). The UAS-CTI created a network of universities, colleges, technical schools, and institutions to prepare



Aviation & Space Education

students for new and exciting careers in the drone workforce. Currently, 84 schools across the U.S. are participating in the UAS-CTI program with new applications coming in every month. Many of the participating schools host drone summer camps and partner with local K-12 schools to teach and encourage drones in the classroom. It has been an incredibly successful program. You can read more about the UAS-CTI program in the article, "Engaging with Academia," in our May/June 2021 issue (bit.ly/FAASB-Arc).

OPERATING A DRONE IS RELATIVELY INEXPENSIVE, EXCITING, AND A FUN HOBBY THAT CAN EASILY SERVE AS AN ENTRY POINT FOR STUDENTS TO ENGAGE IN STEM ACTIVITIES.

The FAA's UAS Integration Office and the FAA Safety Team (FAASTeam) DronePros also participate in STEM conferences, symposiums, and events. They too are passionate about STEM education and volunteer regularly in STEM activities.

Alina George and Diana Robinson are project specialists in the Operational Programs Branch of the FAA's Office of UAS Integration.



High school students in California participating in a drone summer camp hosted by the UAS Technical Education Program (UASTEP), the University of California, Irvine, and local high school teachers.



SAFETY IS A JOURNEY

Technology is advancing at a rapid rate — it changes almost daily. Staying proficient to meet the needs of tomorrow's workforce is not easy, but it is important for each aviation maintenance technician (AMT) to take a personal interest in continued and recurrent training.

The FAA Safety Team (FAASafetyTeam) is committed to helping you achieve the highest level of safety by providing the "tools" and resources you need to enhance your knowledge and proficiency.

Take advantage of the free or low cost training on FAASafety.gov. You will be recognized, awarded, and become a safer technician.

Get An Award for Initial and Recurrent Training

Participate in the AMT Awards Program to get your award for receiving, promoting, and fostering initial and recurrent maintenance training.

- 🔧 Register on FAASafety.gov to enroll in the awards program.
- 🔧 Complete the online Core Course — A Case for Non-Technical Training (ALC-666) — click on the *Maintenance Hangar* tab and you'll find it under *My AMT*.
- 🔧 You can complete the course in multiple sessions, and then take the exam.
- 🔧 Second time's a charm — if you didn't pass the first time, you can re-take the exam right after your first try.
- 🔧 Need a refresher? You can take the course again 90 days later and receive additional AMT or WINGS program credit.

🔧 Eligible training also includes aviation maintenance career-related training in such categories as technology, human factors, and certain courses from an accredited trade school or university.

🔧 You can enter your eligible training in the *My AMT* tab under *Enter Eligible Training*.

🔧 Pro Tip: Keep a personal log to document all completed training and recent experience requirements. Keep all your training certificates.

🔧 Manufacturers, repair stations, and FAASafetyTeam members develop courses for AMT credit with a focus on accident/incident causal factors, special emphasis items, and regulatory issues.

🔧 There's a different core course each year. Next year's course — *Ethics for Aviation Maintainers*.

🔧 Technicians who successfully meet the program requirements within a given calendar year will obtain a certificate of training, and a Bronze, Silver, or Gold AMT Award!

🔧 Your employer can also get a Gold or Diamond Award of Excellence based on the number of technicians in the company that receive an award each year.

Train From Home or Hangar

You'll also find thousands of free, online safety and risk reduction seminars and webinars that you can attend virtually. There's online courses available too. Most are free or low cost.

Need to renew your inspection authorization? There's a list of IA renewal courses and programs as well.



Take a look at the special training projects on risk management and human error in the maintenance hangar tab, and you'll also discover resources on everything from maintenance alerts and safety tips to standards, regulations, and scholarships for up-and-coming mechanics.

🔧 If you have any questions or need help, contact Guy Minor at Guy.D.Minor@faa.gov.

The learning process never ends. Keep an open manual and an open mind. As the Mechanic's Creed says, "... the safety and lives of others are dependent upon (your) skill and judgment."

Jennifer Caron is *FAA Safety Briefing's* copy editor and quality assurance lead. She is a certified technical writer-editor in the FAA's Flight Standards Service.

LEARN MORE

FAA Information and Services for Mechanics
faa.gov/mechanics

Be All You Can Be

Brandan Dadoun is just 17 years old and already has his private pilot's certificate with instrument privileges. This past September, he received the Western Pacific Regional Administrator's Aviation Partner



Brandan Dadoun

Award that honors individuals who promote, improve, and support flight safety. Brandan is an FAA Safety Team (FAASafetyTeam) Rep in the San Jose district and enjoys producing and writing an average of three seminars a week. Over the course of a year, he made possible approximately 150 opportunities for airmen to earn WINGS credits. As an ambassador and spokesperson for young people interested in aviation, he created the Flight Teen Volunteer Program at the San Carlos Airport's Hiller Aviation

Museum, inspiring a significant number of teen volunteers to join. As a trainer in a volunteer network of air traffic controllers, he helps pilots obtain real-world experience on the mic. He also developed an aviation network at his high school with activities, airport visits, and opportunities for students to sit left seat in an aircraft. These are just a few of Brandan's accomplishments as he continues on his flight path to motivate, inform, and encourage young adults to experience the passion he holds for aviation.

➤ Check out Stevie Triesenberg, a top aviation influencer on TikTok @planegirl, and see how she's inspiring the next generation through social media.

➤ "I wanted to help Black students see that they could also work in aviation . . . Representation matters." — read Johnny Rose's story at bit.ly/YouCanAchieve.

Learn how the arts can also be a gateway to aviation through STEAM (science, technology, engineering, *Arts*, and math). Check out Postflight in this issue for more.



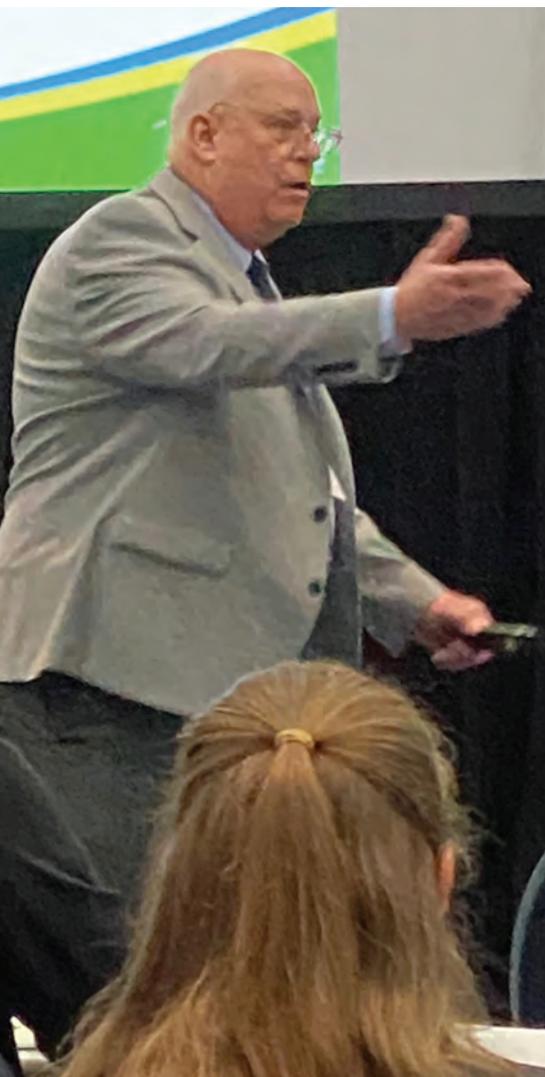
"Starry Flight" image courtesy of artist Melissa Bernard, 2021 graduate, University of Maryland Baltimore County, bachelor's degree in visual arts and print media.



FAASTEAM VOLUNTEERS COME IN ALL SHAPES AND SIZES

Bill Hopper organized the first helicopter safety seminar in St. Louis. Since then he has held scores of safety meetings on behalf of the FAA and through organizations he formed — the Greater St. Louis Helicopter Association and the Greater St. Louis Rotor and Wing Association.

Karen Ann Kalishek has worked with the FAA Safety Team (FAAS-Team) Program Manager (FPM) at the Milwaukee Flight Standards District



Bill Hopper

Office (FSDO) since 2013. Her efforts to recruit new FAAS-Team Reps, schedule meetings, and research topics for webinars made her the agency's National FAAS-Team Representative of the Year in 2019.

Vic Moss uses drones in his profession as an aerial photographer. He has advised local legislators about drone airspace and safety regulations. He is now a member of industry's Drone Advisory Council that provides insight and advice to the FAA.

These are just a few of the more than 2,500 people who volunteered last year as FAAS-Team Reps. They help the FAA spread its safety message to pilots, mechanics, and more recently, drone operators. Representatives are especially important because they encourage members of their community to view aviation safety as a topic of continued education, promoting ongoing participation in safety courses to maintain and increase proficiency. The FAA would welcome more like them.

"Whether they're a pilot, mechanic, or drone operator, FAAS-Team Reps share several important characteristics," said Guido Hassig, the National FAAS-Team program manager for unmanned aircraft systems (UAS) or drones. "They are passionate about promoting aviation safety and supporting the FAAS-Team's mission, and well renowned for their talents as aviation safety experts," he said.



Karen Ann Kalishek

Hassig and his National FAAS-Team colleagues, Guy Minor (airworthiness program manager), and Kevin Clover (operations program manager), believe FAAS-Team Reps bring significant benefits — both tangible and intangible — to the agency.

"Their impact is huge," said Clover. "Reps multiply our efforts so much," he explained. "They're everything to our program," said Minor.

FAAS-Team Reps also cover a wide variety of communities to include those involved in sport aircraft, gliders, and balloons. Their expertise on specific subjects complement FAA inspectors' all-around knowledge. In a sense, they serve as the eyes and ears of the agency.

For example, FAAS-Team Rep Adam Magee has used his life-long love of ballooning to become a leading safety advocate, creating hot air balloon-specific content on FAASafety.gov. His balloon safety presentations have

reached close to 2,000 balloon pilots during the past year.

FAASTeam Reps also provide increased access to members of the aviation community via networks, email lists, or other groups on which the FAA can rely. For instance, Moss, an aerial photographer, administers two social media groups with a combined membership of 18,000-20,000 drone enthusiasts. As a FAASTeam “DronePro,” he conveys important information about the FAA’s drone safety standards, regulations, and policies through those groups while promoting FAA safety seminars. That’s vital to the FAA considering there are already more than 800,000 drones registered in the United States, with more expected. As for what prompted Moss to initially volunteer with the FAASTeam, it’s all about safety. “I

wanted to jump in on that and help the industry,” he said.

Reps also supplement the FAA’s resources through the thousands of safety briefings they host each year. Volunteers have been influential in promoting continual training and skills enhancement for pilots through the WINGS Pilot Proficiency Program, and for mechanics through the AMT Awards Program.

“When it comes to attending seminars, it is often difficult for mechanics to participate because, at the end of the day, they are ready to go home and spend time with their families and hobbies,” explained Bill Hopper, director of safety for Helicopters, Inc., and FAASTeam Rep for airworthiness out of the St. Louis FSDO. “Encouraging mechanics to participate in proficiency courses can be a hard sell,”

he added. But it’s one that Hopper has made for the last 28 years. His motivation is simple, “When you are in aviation, you’re either a contributor or a user. I prefer to be a contributor,” he said.

At 66, Hopper said he has no plans to retire. In his mind, there’s no hard part to being a rep. “I just enjoy doing it. It’s a time commitment. If you enjoy what you’re doing there’s nothing that’s hard. I will continue to promote aviation safety as long as I can do it.”

Perhaps one of the biggest advantages FAASTeam

volunteers offer is who they are not: government employees. That’s an important factor as the FAA seeks to reassure the aviation community of its intent to work together as colleagues. “They’re our link to the community,” said Clover. “They can talk to someone that an FAA employee could not. It helps build a better safety culture.”

THE FAA HAS BENEFITED ENORMOUSLY FROM FAASTEAM REPS WHO HELP PUSH THE AGENCY’S SAFETY MESSAGE TO VARIOUS PARTS OF THE AVIATION COMMUNITY.

FAASTeam Rep Karen Ann Kalishek agrees. “It brings the FAA, which can seem like a large bureaucratic organization, down to a personal level, one pilot talking to another,” she said.

As a flight instructor and designated pilot examiner out of Green Bay, Wisc., Kalishek says she has “become, personally, very comfortable working with FAA people. They’re wonderful, safety-oriented individuals who are there to help and promote safety.”

The core is that I’m very passionate about aviation safety,” said Kalishek about her role as a FAASTeam Rep. “I already know seven people who have passed in aviation accidents. The more I can do to prevent similar occurrences, the better.”

If you’re interested in becoming a FAASTeam Representative, contact a FAASTeam Program Manager (FPM) at your local Flight Standards District Office. Go to [FAASafety.gov](https://www.faa.gov/FAASafety), click the “Resources” tab, and then “Directory” (second from top). Enter your state or region and view the list of program managers at the top of the list.

Jim Tise is an editor in the FAA’s Corporate Communications division.



Vic Moss



PILOTS PROPEL STUDENTS INTO AVIATION

To help bridge the employment gap in aviation, FAA employees are inspiring students to pursue aviation and aerospace careers.

These employees are part of the FAA's Science, Technology Engineering, and Math (STEM) Aviation and Space Education (AVSED) program established to expose students to aviation and aerospace careers and to promote STEM education. Participating employees are part of a broader program designed to introduce students to aviation careers involving airports, air traffic controllers, aviation maintenance technicians, unmanned aircraft systems (drones), pilots and space.

You may be surprised to learn that many pilots work in the government sector. The FAA's Aircraft Certification Service, for example, employs up to 30 flight test pilots, about half of whom fly helicopters, along with other aircraft. Their job includes evaluating helicopter safety and determining if the aircraft, parts, electronic systems, or other equipment or procedures meet FAA standards. Base pay ranges from \$83,458 to \$129,384, depending on qualifications and experience, with locality increases from 15.95% to 41.44%.

Aviation job opportunities are on the rise. The expectation is that the need for aviators will outpace needs in other occupations. According to the Federal Bureau of Labor Statistics, careers for helicopter pilots and other commercial pilots (excluding airline pilots), expect to grow "much faster than the average for all occupations." The Bureau also reports that "the number of commercial pilot jobs is projected to increase in various industries, especially in ambulance services."

The median annual wage for commercial pilots in May 2020 was \$93,300, which compares favorably to the median pay for all occupations at \$41,954 a year, given a 40-hour workweek.

Despite these competitive pay rates and demand, the industry still struggles to fill positions due to the current lack of available pilots.

This potential shortage and the opportunity for well-paying jobs is why U.S. Rep. Eddie Bernice Johnson reached out to the FAA's STEM AVSED Adopt-a-School program to promote aeronautical careers among students in her Dallas-area district.

The FAA Adopt-a-School program encourages FAA personnel to get involved to share personal knowledge and aviation experience with educators and students. The program matches the aviation skills, expertise, knowledge, and resources of the FAA with the needs of the educational objectives of local schools. The FAA identifies Adopt-a-School locations in each region. Two years ago, schools in Maryland and Texas participated in a limited pilot of the program. This year, at least one school per FAA region will participate. In the Southwest Region, for example, which includes Arkansas, Louisiana, New Mexico, Oklahoma, and Rep. Johnson's district in Texas, the FAA will adopt the 580-student Atoka Elementary School in Atoka, Okla., that serves a high percentage of Native American students. The Southwest Region may also add a Dallas Independent School District campus.

The program selects schools based on their diverse populations, proximity to FAA facilities, and the proximity of potential industry partners. Dallas School District representatives and



other educators recommended a group of 4th graders to participate in the program since students often start thinking about future careers by the time they enter middle school.

In 2022, the Adopt-a-School pilot lesson will focus on introducing 4th-grade students to various pilot careers and the solutions they provide. The lesson will review the different types of training and skill requirements for pilots, the types of aircraft they fly, and the different work they perform.

"We're really excited about it," said Janet Scott, FAA Adopt-a-School Southwest Region Program Lead.

The speakers will encourage students interested in aviation careers to do their best in STEM-focused and aviation-focused curricula. "These subjects will help them with their paths to success," Scott said.

FAA pilots who want to volunteer and people who want to learn more about the Adopt-a-School program can email program leaders at 9-APL-FAAEducation@faa.gov. Or contact a STEM AVSED regional program analyst at the nearest FAA regional center. See the website to learn more: faa.gov/education.

Gene Trainor works as the communications specialist/executive technical editor for the FAA's Compliance and Airworthiness Division.



Check out our GA Safety Facebook page at [Facebook.com/groups/GASafety](https://www.Facebook.com/groups/GASafety)

If you're not a member, we encourage you to join the group of more than 15,000 participants in the GA community who share safety principles and best practices, participate in positive and safe engagement with the FAA Safety Team (FAASTeam), and post relevant GA content that makes the National Airspace System safer.

STEM to the Students

I am an FAA Safety Rep from Cleveland, Ohio. Six years ago, I started the Aerospace Engineering and Aviation program at Steubenville High School. We are an Ohio career and technical program, and I am happy to say that we started our pilot program in affiliation with the AOPA You Can Fly curriculum, which has grown to include the 4th-12th grade classes. We have implemented the FAA Safety Briefing magazines since the beginning; our students enjoy the articles. During the pandemic, they were crucial to educational quality due to the switch to online learning, and have been a huge benefit ensuring all areas of aviation are meeting FAA standards as our industry evolves.

— Natalie

Hi Natalie — Thanks for sharing and we're so glad to hear that you found success in starting this aviation program with this crucial younger demographic. It's always nice to hear when our efforts to provide informative and

engaging pieces have been successful, and we are certainly happy to support Science, Technology, Engineering, and Math (STEM). Some of your students might be especially interested in the two GA Flying Companion issues we've produced (Jul/Aug 2014 and March/April 2018 at bit.ly/FAASB-Arc), since they offer a very basic introduction to a broad range of topics involved in GA flying. Thanks again!

How Do I... ?

Again, a stellar issue of FAA Safety Briefing focusing on UAS aircraft. Now that I've read your article "How Do I... ? FAA Resources for UAS" (bit.ly/FAAdroneResources), I'm thinking of becoming a drone instructor. Yes, I know it won't be the same as boring holes in the sky in a Cessna, but during the pandemic, which is still ravaging the Caribbean, I thought I could add on this skill set. Their multitude of uses is mind blowing, and it will be an asset to capitalize on it. I look forward to next month's article!

— Niven

Hi Niven — Thanks so much for the feedback. It's always nice to know that we've hit the mark in terms of material that our fellow aviators need and want to receive. It is most definitely a team effort! Congrats on sharpening your drone skills and qualifications. One of the great things about aviation is that there is always something new to learn.

The FAA's The Air Up There Podcast Presents: "Drone-ing" Your Own Business

Ever wanted to start your own business? Why not do it with a drone! On the latest episode of the FAA's The Air Up There podcast, you'll learn about drone entrepreneurship and the versatility of drone piloting. Check out the full episode here: bit.ly/DroneCareers.

Get the LED Out

Great information on LED (light emitting diode) lights (see the article here: bit.ly/LEDtechnology). As a pilot, I installed LED lights in the plane too — lots brighter and less wear and tear on the electrical system. See and be seen — good safety improvements.

— John

Hi John — Thanks for your feedback and for sharing your experience with the LED lights on your aircraft. You're 100% correct — they're brighter, lighter, use less power, and are great for increasing visibility to other aircraft, both in the air and on the ground.



For more stories and news, check out our new blog "Cleared for Takeoff" at medium.com/FAA.

Let us hear from you! Send your comments, suggestions, and questions to SafetyBriefing@faa.gov. You can also reach us on Twitter @FAASafetyBrief or on Facebook at facebook.com/FAA.

We may edit letters for style and/or length. Due to our publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards Office or air traffic facility.



STEAM RISES

“Education is not the filling of a pail, but the lighting of a fire.”

— William Butler Yeats



Most people are familiar with the fiery incarnation of the phoenix, a mythological bird that obtains new life by rising from the ashes of its predecessor. I’ve always loved the symbolism, so various versions of the fierce and fiery phoenix hang on my walls. But I also have a medallion of the water-and-fire phoenix, which is a combination of the more familiar fire creature and an alternate water version that cycles from ice to a pool of frozen water, then to liquid, and finally back to the solidity of ice.

If you’d care to follow me on this flight of fancy, perhaps we let this creature illustrate a whimsical riff on

Yeats’ observation. Just as water and fire are both integral to this version of the phoenix, education involves both filling the pail and lighting the fire. I can’t resist observing that the “both/and” nature of the riff has linguistic support: “burn” can refer to both water — a stream — and fire.

“The whole purpose of education is to turn mirrors into windows.”

— Sydney J. Harris

When it comes to igniting the passion for aviation, whether as a subject, a hobby, a career, or all three, education in science, technology, engineering, and math (STEM) is clearly important. But as an enthusiastic liberal arts major and an avid all-over-the-map bibliophile, I want to conclude this issue of *FAA Safety Briefing* with a plug for how the arts can also be a portal to aviation. That

was certainly true for me. Books, stories, artwork, and movies about airplanes and their crews ignited and fed my passion for aviation. The various forms of aviation art also encouraged me to take a greater interest in, and liking for, science and math classes. Since portals and windows work in both directions, I’d like to encourage those whose aviation interest is rooted in STEM to branch out into STEAM — let your interest in aviation spark curiosity about how both the beauty and the science of aviation can be expressed through the arts. If you need a place to start, I’ve included a few personal favorites in the sidebar. I’d love to hear from you on worthy additions to the list. Enjoy!

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing* and a Special Assistant in the FAA’s Flight Standards Service. She is a general aviation pilot and flight instructor.

The universe of aviation-themed books, films, podcasts, and other artistic expression is vast and constantly expanding. We offer here just a few selections we have enjoyed, in hopes that you will find them equally enchanting.

AVIATION BOOKS:

- *A Gift of Wings* (Richard Bach)
- *Biplane* (Richard Bach)
- *Fate is the Hunter* (Ernest K Gann)
- *The Flight* (Dan Hampton)
- *Flight to Arras* (Antoine de Saint-Exupery)
- *Fly Girls* (Keith O’Brien)
- *The High and the Mighty* (Ernest K Gann)
- *Jackie Cochran: An Autobiography* (Jackie Cochran)
- *Listen! The Wind* (Anne Morrow Lindbergh)
- *Night Flight* (Antoine de Saint-Exupery)

- *North to the Orient* (Anne Morrow Lindbergh)
- *Skyfaring: A Journey with a Pilot* (Mark Vanhoenacker)
- *Stranger to the Ground* (Richard Bach)
- *Talkin’ about Bessie: The Story of Aviator Elizabeth Coleman* (Nikki Grimes, illustrated by E.B.Lewis)
- *Travels with Puff* (Richard Bach)
- *Unlocking the Sky: Glenn Hammond Curtiss & the Race to Invent the Airplane* (Seth Shulman)
- *West with the Night* (Beryl Markham)
- *Wind, Sand, and Stars* (Antoine de Saint-Exupery)
- *The Wright Brothers* (David McCullough)

PODCASTS:

- *The Air Up There* (www.faa.gov/podcasts)
- *Airplane Geeks* (airplanegeeks.com)
- *Aviation Careers* (aviationcareerspodcast.com)
- *Ask the A&Ps* (aopa.org/podcasts)

FILMS:

- *Flight of the Phoenix*
- *Fly Away Home*
- *Flying the Feathered Edge: Bob Hoover Project*
- *The High and the Mighty*
- *Living in the Age of Airplanes*
- *Memphis Belle*
- *One Six Right*
- *Red Tails*
- *The Right Stuff*
- *Top Gun*

JIM BROUGH

National Aviation and Space Education Program Analyst, *FAA Aviation Workforce and Education Division*



A love for aviation has always been in Jim Brough's blood. He can't help looking up every time an airplane flies overhead. He always knew that he wanted to fly someday. As a teenager, Jim joined Civil Air Patrol as a cadet to get on a flightpath to success.

"Civil Air Patrol was a life-changing experience," he notes. "Being part of CAP allowed me to be around airplanes and around people who shared my same passion for aviation."

Jim's parents advised him to pursue a college education and in 1986 he received a bachelor's degree in elementary education from Keene State College in New Hampshire. Then in 1997, he earned a master of education degree in heritage studies from Plymouth State College.

While working as a teacher in the 1990s, Jim's vector finally crossed with his passion for aviation when he earned a private pilot certificate.

"My principal asked me if I would teach an aviation class to students," Jim said. "That's where my career in aviation education took off!"

Jim began teaching a simple course using the very first flight simulator available on a computer. It allowed him to teach basic math skills like *rate times time equals distance*, which

evolved into teaching ratios and scale. He expanded his teaching to include flight patterns, communications, and other related topics. He also worked with the Experimental Aircraft Association's (EAA) Young Eagles program to give flights to his students.

Recognition for his efforts resulted in a year-long paid sabbatical to develop low-cost aviation programs for schools throughout New Hampshire. During that year, Jim connected with the FAA's Science, Technology, Engineering, and Math (STEM) Aviation and Space Education (AVSED) program, which has been an integral part of FAA outreach and the national education system for decades. The program was established to introduce K-12 students to aviation



and aerospace careers and to promote STEM education. Jim assisted the FAA with educator workshops and running aviation career education (ACE) academies.

Jim became an aviation education professional when he was hired to work directly for the FAA as the

national AVSED program analyst under the FAA's Aviation Workforce and Education Division.

"With the support of numerous partners in the public and private sectors, we reach out to students around the world so they can learn more about aviation, as well as the critical role that STEM plays in a young aviator's future," Jim explains. "You don't have to get every kid to pursue aviation, but the one you miss might have made all the difference."

At the core of the program are strong relationships with the community and aviation organizations. This vast network facilitates information sharing, increases resources, and provides support to the public.

The FAA has redesigned the STEM AVSED program to address current issues that the aviation community is facing. This redesign is a high priority for the FAA with a focus on building the aviation and aerospace workforce of the future.

"Many people think aviation is too expensive, so they don't entertain the possibility. We want to show the public how they can pursue their dreams, and inform them about grants, scholarships, and other opportunities that exist to support them," Jim says.

Jim encourages general aviation pilots, our ambassadors to the aviation world, to serve as mentors and sources of information to our youth and to others interested in the aviation industry. "Don't expect schools and community organizations to come to you. Go out and be a role model and share your passion for aviation. It sounds simple, but it can make a huge impact."

Paul Cianciolo is an associate editor and the social media lead for FAA Safety Briefing. He is a U.S. Air Force veteran, and an auxiliary airman with Civil Air Patrol.



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Look Who's Reading *FAA Safety Briefing*

Pilot, pioneer, and
global STEM ambassador
Shaesta Waiz keeps her
safety skills sharp by
reading *FAA Safety Briefing*.

