

# AIRMAN

THE OFFICIAL MAGAZINE OF THE UNITED STATES AIR FORCE

## STEM INITIATIVES



How is the Air Force building its team of STEM professionals for the future?



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# FYSA

## BRIDGING THE SCIENCE GAP

AN AIR FORCE PODCAST

Podcast by  
**Angel Orozco**  
Staff Sgt. Mikayla Daly

**CLICK TO LISTEN**  
OPENS IN BROWSER

In this episode of FYSA we'll learn how the Air Force is working to encourage new generations to pursue STEM careers through programs like Project Tuskegee, an outreach effort that exposes young people in diverse communities to what the service offers.

We meet a young engineer who benefitted from the Edison Grant, a funding source that gives Department of the Air Force STEM professionals the freedom to explore new ideas and technology.

We also meet a rocket launch engineer and an enlisted scientist, both involved in Project Arc, a program that sends STEM pros out to work with installations on innovative approaches to local problems.

Civilian scientists play a major role in developing solutions to problems, and we introduce you to one civilian scientist doing important research who also actively encourages opportunities for diversity in STEM.





# STEM INITIATIVES

Cadet Alexandra Weisenburger makes bacterial growth media at the U.S. Air Force Academy in Colorado Springs, Colo. (U.S. Air Force photo by Trevor Cokley)

Story by  
**Jerry Cormier**

The Department of the Air Force's need to accelerate technological development has been getting a great deal of attention, with leadership putting renewed focus on modernizing the Air and Space Forces.

The service's Science and Technology Strategy for 2030 and beyond was released in 2019. Air Force Materiel Command is tasked with implementing the strategy. The Air Force Research Laboratory manages the lines of effort in the document.

The strategy recognizes a "...rapidly growing China and resurgent Russia..." that "... aim to coerce their regional neighbors, undermine long-standing alliances, and displace American influence from critical regions around the globe."

To counter that, and to recognize what Secretary of the Air Force Frank Kendall calls the "pacing challenge" with China, the strategy addresses the need for transformation of strategic capabilities driven by scientific and technological advances.

That goal requires the ability to recruit, develop and retain a high-quality military and civilian workforce, as called for in the National Defense Strategy.

# EDISON GRANT

The Air Force is working toward building an officer corps with more advanced degrees in science, technology, engineering, and math.

Part of the effort to forge a more scientific and technologically proficient uniformed force includes expanded opportunities to learn and apply knowledge.

The **Edison Grant** program provides funding for technical experts to do short-term engineering experiments. The goal is to build technical competence and instincts, while creating an Air Force-wide network.

**Capt. Kavi Muraleetharan**, a developmental engineer with the Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio, received an Edison Grant in 2022. It gave him the opportunity to re-imagine engine design. "The Edison Grant is just, try something," he said, "It's low risk, but it could potentially be a high payoff."

Cadet Margaret Warner examines *S. aureus* (bacterial) growth at the U.S. Air Force Academy in Colorado Springs, Colo. (U.S. Air Force photo by Trevor Cokley)



# PROJECT ARC

**Project Arc** is another way the Department is helping uniformed scientists and engineers to gain experience while assisting units with solutions where they operate. It bridges the gap between technical experts and warfighters by sending engineers to operational locations to assist with technical problems.

Space Force Master Sgt. Vince Olshove, an engineer working at **AFRL's Center for Rapid Innovation**, has been active in Project Arc. "It gives you freedom to get out there directly after user needs and requirements," he said. "You go into a location, and you can literally walk in and say give me your top five challenges and let me get after them."

Space Force **First Lt. Kevin Tran**, a space launch engineer, has also worked with Project Arc. He says the project is about tailoring solutions for a specific situation, something a geographically separated headquarters office can't necessarily do.

Tran adds working with the program has been the best experience of his career, "Not only being able to work with people with diverse skillsets, but also being able to tackle a variety of different problems, big or small, has been awesome."

**Project Arc Engineer 2nd Lt. Jacob Geil** takes a measurement on the ram air scoop fan assembly Sept. 22, 2022, at Barksdale Air Force Base, La., as part of an initiative to embed engineers at operational wings to solve technical problems.

As part of the Project Arc program, Geil and his teammate were stationed at Barksdale AFB for six months to help develop, test and transition Airmen and commercial solutions. (U.S. Air Force photo by Staff Sgt. Christopher Tam)





Dr. Candice Hatcher-Solis, 711th Human Performance Wing research scientist, poses for a photo, Nov. 7, 2022 at Wright Patterson Air Force Base, Ohio.

Dr. Hatcher-Solis is a research biological scientist for the Air Force Research Laboratory and is the team lead for Neurobiology of Cognitive Performance. (U.S. Air Force photo by Staff Sgt. Janiqua P. Robinson)

## UNIVERSITY AFFILIATION

With an eye to growing the next generation of civilian scientists and engineers, the Department of the Air Force made history in January 2023 by sponsoring **Howard University** as its first university affiliated research center. It is also the first in the Department of Defense that is associated with a historically Black college or university. The Department is making a five-year, \$60 million commitment to the school to fund research, faculty, and students.

“Historically Black colleges and universities graduate 30% of Black science, technology, engineering and mathematics professionals in the United States, but receive less than .05% of Department of Defense research funding,” says **Dr. Victoria Coleman**, chief scientist of the Air Force.

“This is clear evidence that untapped potential to address National Security imperatives resides at historically Black colleges and universities but has been unavailable to the Department of Defense due to historical inequities.”

**Dr. Candice Hatcher-Solis** is a civilian research biological scientist with the **Air Force Research Laboratory’s 711th Human Performance Wing**. She’s been recognized by the Black Engineer of the Year Awards with the Most Promising Scientist in Government Award, and more recently received the AFRL Science and Engineering Early Career Award. She says she loves the fact that research she is doing in the lab can fix near-term problems.

“Technology that I’m developing and working on could transition to the field in a few years,” Hatcher-Solis says. “I’m really passionate about research that promotes safety for the warfighter.”

She is also committed to creating opportunities for young people interested in a STEM career. “I am actively involved in mentoring; I have affiliate faculty positions at our local universities...I always take summer interns and I have graduate students.” She adds, “I want people to know there are resources for women to be successful as scientists...I want them to know that underrepresented minorities work in the Air Force...and they have great contributions to make.”





# GRANT PROGRAM PROMOTES INNOVATOR CULTURE FOR DAF SCIENTISTS

Story by  
Tech. Sgt. Shelby Kay-Fantozzi

After a run of unsuccessful experiments, inventor Thomas Edison famously declared that he'd found hundreds of ways to not make a light bulb. An Air Force grant named after Edison and his fail-forward mindset allows Department of the Air Force scientists and engineers to design and execute their own experiments, building a culture that accepts failure as the first step of innovation.

Capt. Kavi Muraleetharan, a developmental engineer at the Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio, leveraged a \$75,000 Edison Grant to test possible improvements to aircraft engines.

"We want to start exploring innovative, interesting ideas to improve their form factor and their efficiency," he said. "We want to make something that could really transform how we develop and eventually field these technologies."

Before he could lead testing, Muraleetharan had to apply for the Edison Grant, justifying the experiment, planning field testing, and connecting with mentors—a requirement for the application that guarantees candidates will come away from the process with at least one win.

U.S. Air Force Capt. Kavi Muraleetharan, Air Force Research Laboratory mechanical and aerospace developmental engineer, poses for a photo while researching and developing detonation engines for weapon systems.  
(U.S. Air Force photo)



“When applying to the grant, we have to identify senior military members to mentor and coach us along the way,” he said. “So, we start networking and building relationships with other technical and engineering scientists within the Air Force. I talked to a few of my civilian counterparts and they helped me put an amazing proposal in.”

For candidates whose applications are accepted, they practice taking the lead on a project from the ground up.

“I think it was awesome to know that I could start this project however I want. I could also use it to get mentorship and guidance,” Muraleetharan said. “It was an excuse to think of something crazy, just to try and see if it worked. That’s the freedom that this proposal gave me.”

Muraleetharan used that freedom to develop and test an irregularly shaped rotating detonation engine, asking whether a change to the engine’s traditional circular shape could improve its efficiency.

More efficiency could mean more speed or distance with less fuel, more energy with a smaller engine, or more capacity for weapons in an aircraft’s weapons bay, Muraleetharan said. Experimentation pits these hopes against the realities of physics and engineering.

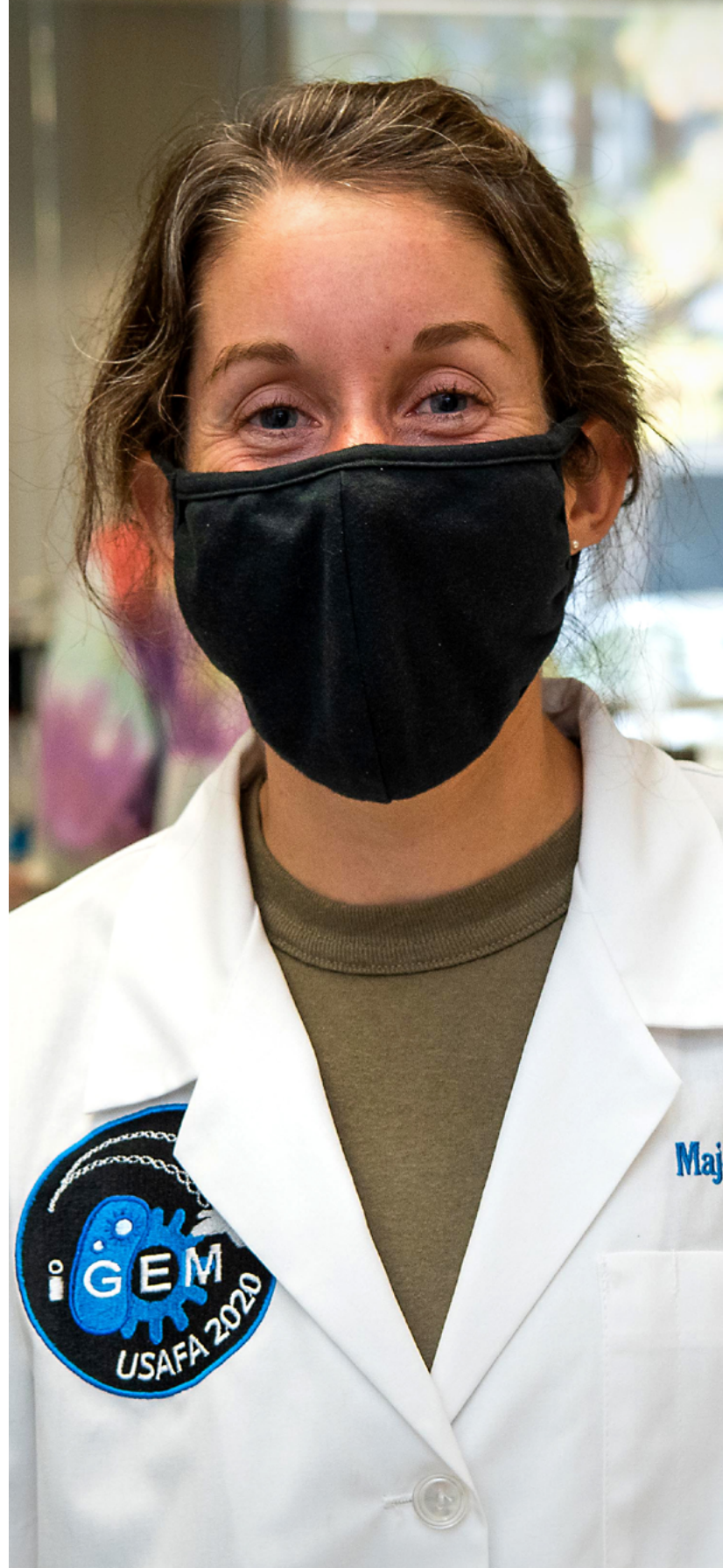
“How do we make it feasible?” Muraleetharan asked, listing some of the key questions of his grant proposal. “How do we decrease some of the thermal effects and some of the acoustic effects? And how do we get a feel of it within a weapon system to make it go faster, more efficiently and get the biggest power out of the limited fuels that we have?”

His experiment is just one line of thought about faster, smarter ways to propel aircraft.

“We like to go as fast as possible. We want to see what kind of interesting fuels we can use, so we don’t have to rely on the same things that we’re running low on,” Muraleetharan said.

“We want to see what other thermodynamic cycles we can do to get the work potential we want to power aircraft. But detonation engines are just one hypothetical way to power an aircraft. We need to think outside the box: What are some other ways we can power our Air Force fleet in the future?”

The beauty of the Edison Grant, according to Muraleetharan, is that outside-the-box thinking is rewarded whether the experiment succeeds or not.



Maj. Erin Almand, U.S. Air Force Academy microbiologist, uses an Edison Grant to research menstrual products used by military women and advance what is known about Toxic Shock Syndrome, at the U.S. Air Force Academy in Colorado Springs, Colo.  
(U.S. Air Force photo by Trevor Cokley)



“The point of the Edison Grant is just to try something,” he said. “It’s low risk but it could have high payoff. Recipients get the freedom and privilege to work on something innovative knowing that if it does turn out well, it can get funded further by other Air Force dollars. If it didn’t turn out as we expected, we still learn a lot about how it feels to manage your own experimentation project and learn along the way.”

By taking the highest risk acceptable with a relatively small budget, scientists and engineers can use the grant to get as much value out of a test that doesn’t work as one that goes as planned.

“It is in the spirit, or the essence, of the Edison Grant for things to potentially fail—you learn a lot through failure,” Muraleetharan said.

“We shouldn’t shy away from that as we’re gearing up towards whatever’s next, improving our technologies and making awesome weapon systems. We need to fail. We need to figure out what works and we need to do it fast. That’s what the Edison Grant does: it puts a sharp timeline on building an experiment and seeing what we learn from it.”

The sharp timeline responds to the sense of urgency Air Force Chief of Staff Gen. CQ Brown, Jr. encourages in his Accelerate Change or Lose call to action.

“Everyone in the world is designing their own tool, their own trinket, their own technology and it is impressive how quickly technology has grown these last few years,”

Muraleetharan said. “We have had a lot of commercial boom but we also have a lot of adversaries building up technology that we need to compete with.”

Muraleetharan believes the Air Force is leading the way on thinking of how to fight the future fight and how technologically proficient Airmen are the leaders of that enterprise. Airmen with science and technology jobs or backgrounds can help with research and development or test and evaluation, he said, but they can also advise on the policies that the Air Force is enacting to rapidly build new technology.

“We’re trying to promote and define the culture of fail faster and speed with discipline,” Muraleetharan said.

“We want to do the background work to make sure what we’re doing is technologically feasible and

First Lt. Jeremiah Williams, right, works in the “clean room” of the Air Force Research Laboratory Sensors Directorate at Wright-Patterson Air Force Base, Ohio.

Williams is a recipient of an Air Force Edison Grant, which allows active duty researchers to lead short, highly-focused projects, with their own money.  
(U.S. Air Force photo by Michael Ross)

potentially sound, and we test often, and test with purpose. If we find out something fails, we just need to redirect. And if we find that it works, we can build upon it.”

Frequent, rapid tests and experiments show the agility of DAF science professionals and model the innovation, emphasized by Brown.

“Providing funding to military members who have a culture of charging ahead fast and solving the problem as creatively as possible is a great fit,” Muraleetharan said.

“As a whole, the Air Force can learn from how we’re promoting this culture. You’re fostering a climate of trust with everyone associated with the project. And if someone has an idea, if it makes sense, let’s try it out. That’s the true spirit of innovation. Trust your people and foster an attitude of getting things done. We want to learn together, and we have a mission to solve but it’s okay if we fail on the way. We need to work hard; we need to work fast; and as a team, we need to work together to make sure it makes sense. Let’s try it out.”

The makeup of the team matters, according to Muraleetharan, a wide variety of background leads to a wide variety of ideas for problem solving.

“Diversity is at the forefront of involving people who are ready to think differently, implement differently and challenge the system as quickly as possible. Then we can get to a faster and more lethal Air Force and we can get technology to the people.”

“The Air Force has found a way to hire and maintain the brightest talents that this nation has to offer,” he added. “Everyone has an amazing story. Everyone is looking out for the mission and for the people. I appreciate the awesome climate at work every day.”

The uniqueness of the climate, the mission and opportunities, like the Edison Grant, are never lost on Muraleetharan.

“As uniformed members of the Air Force, and as scientists and engineers, we get to develop, test and field awesome technology that the Air Force provides for the Department of Defense and for the United States,” he said. “One of the only ways you really get to do this is by being part of the Air Force team directly.”

For more information on Edison Grants, send a query to [EdisonGrants@us.af.mil](mailto:EdisonGrants@us.af.mil)



U.S. Air Force Capt. Kavi Muraleetharan, Air Force Research Laboratory mechanical and aerospace developmental engineer, poses for a photo, Nov. 8 2022, at Wright Patterson Air Force Base, Ohio.

Muraleetharan is currently researching and developing detonation engines for weapon systems, which use explosive combustions to propel the munition to the target. (U.S. Air Force photo by Staff Sgt. Janiqua P. Robinson)



# STEM PROFESSIONALS FIND DIVERSE EXPERIENCES, CAREER OPPORTUNITIES IN PROJECT ARC

Story by  
**Amy Christopherson**

Whether a steppingstone for future career goals or a life-long career, the Department of the Air Force offers science, technology, engineering and math professionals opportunities to grow and thrive in diverse environments. The Air and Space Forces employ enlisted, officer and civilian scientists who develop technology and innovation to support a wide variety of missions.

Project ARC is one of the opportunities the Air Force offers for Airmen, both officers and enlisted, to make a difference. The project screens scientists and engineers and places them in units across the Air Force to experience missions firsthand, developing tailored solutions to local challenges.

Project ARC is designed to embed technically-minded military members into different units across our force, where they work alongside operators to come up with innovative solutions,” said **1st Lt. Kevin Tran**, a **National Space Intelligence Center** space launch engineer working on Project ARC.

Tran said Project ARC is different from the typical acquisitions development approach because the acquisitions professional is engrained into the mission itself, working side by side with the operators.

**1st Lt. Andrew Foor**, Project Arc engineer, welds together supporting parts for the hardening of a low-cost threat emitter, Oct. 18, 2022, at Luke Air Force Base, Ariz.

Foor, an electrical engineer by trade, worked with his teammate to help Luke AFB modernize its ranges with emerging, high-impact technologies.  
(U.S. Air Force photo)

There’s often a program office designed to tackle broader Air Force issues or requirements, but the office is geographically separated from the operators who are actually doing the mission, Tran stated. This can lead to a program office missing context that they need to be able to properly tailor the solution to the actual operators.

“This means you’re understanding not only their mission set but also their pain points and problems they currently experience,” he said. “Being able to contextualize that allows you to come up with a tailored solution to address their specific pain point.”

Space Force Master Sgt. Vince Olshove, an AFRL Center for Rapid Innovation engineer, said Project ARC differs from the innovation cells at many bases

by screening individuals for their backgrounds and skillsets, and matching them with organizations that need those skills.

Project ARC requires each participant to be an open thinker, communicate well with others and enjoy working innovatively, according to Olshove. Most participants also have a STEM degree. Joining the program requires an application process that differs from other Air Force programs.

Olshove said he applied to the program when he saw an announcement that started with “give me your tinkerers, your thinkers... .” The application led to an atypical interview process, with free-form conversational questions that screened applicants for technical skills as well as the personality traits required for team members. After he was selected, Olshove was assigned to the **621st Contingency Response Wing** at **Travis Air Force Base, California**.

One of the early projects he worked on was for survival, evasion, resistance and escape specialists. The SERE team mentioned their technical medical dummy was failing, with long waits for rare and expensive parts delaying repairs.

Olshove took one of the pieces to Phoenix Spark, the Travis AFB Spark Cell, where they 3D-scanned and created a mold to make replacement parts. Olshove ordered silicone and cast new parts for the dummies. The whole process took about a week.

The Project Arc team was able to deliver a mold the SERE specialists could take to the field and use to create new gaskets as needed. That opened their eyes to other possibilities.

“That was the first domino that led to us talking about a lot more projects—some very large and many super-small and easy to achieve like that,” he said.

Olshove credits his time with Project ARC with opening the door to his current position at the Center for Rapid Innovation. He was able to bring the larger projects that he couldn’t address during his Project ARC team’s six-month rotation at the 621st CRW to the CRI.

Tran joined the Space Force via ROTC while he was earning his undergraduate degree in aerospace engineering. He wanted to make a broader impact than he may have had in a civilian career, and he saw military service as the way to step out of his comfort zone.

Though many people in the engineering field follow the typical route of getting the degree and pursuing contracting positions in the aerospace industry, Tran said he’s found that military service offers more opportunities for growth through meeting a wider variety of people and being ingrained in different mission sets, and these opportunities support his goals for the future.

Tran plans to pursue a master’s degree and eventually move into commercial space exploration, using the experiences he’s gained in the military. He says experience as a flight-test engineer in the Space Force would feed into his overall goal.

“Many people aren’t aware the military has a variety of different jobs,” he said. “[Serving in the military] is not just out in the field shooting guns—we have engineering-related career fields, we have software-related career fields. There are all kinds of diverse career fields that you can be involved in.”



LEFT: U.S. Space Force 1st Lt. Kevin Tran, National Space Intelligence Center space launch engineer, poses for a photo, Nov. 8 2022, at Wright Patterson Air Force Base, Ohio.  
(U.S. Air Force photo by Staff Sgt. Janiqua P. Robinson)



RIGHT: U.S. Space Force Master Sgt. Vincent Olshove, Air Force Research Laboratory Center for Rapid Innovation, poses for a photo at Wright Patterson Air Force Base, Ohio.  
(U.S. Air Force photo by Staff Sgt. Janiqua P. Robinson)

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**CAPT. KAVI MURALEETHARAN**  
DEVELOPMENTAL ENGINEER  
AIR FORCE RESEARCH LABORATORY



VIDEO INTERVIEWS:  
**STEM Professionals**

# Capt. Kavi Muraleetharan

U.S. Air Force  
**Developmental Engineer**

Capt. Kavi Muraleetharan, a developmental engineer with the Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio, received an Edison Grant in 2022. It gave him the opportunity to re-imagine engine design. "The Edison Grant is just, try something," he said, "It's low risk, but it could potentially be a high payoff."

**"We want to start exploring innovative, interesting ideas..."**

**Capt. Kavi Muraleetharan**  
Developmental Engineer & Edison Grantee



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**1 LT KEVIN TRAN**  
ROCKET LAUNCH ENGINEER  
NATIONAL SPACE INTELLIGENCE CENTER



VIDEO INTERVIEWS:  
**STEM Professionals**

## First Lt. Kevin Tran

U.S. Space Force  
**Space Launch Engineer**

**"Being able to not only work with people with diverse skillsets, but also...being able to tackle a variety of different problems, big or small, has been awesome."**

**1Lt. Kevin Tran**  
U.S. Space Force & Project Arc Participant

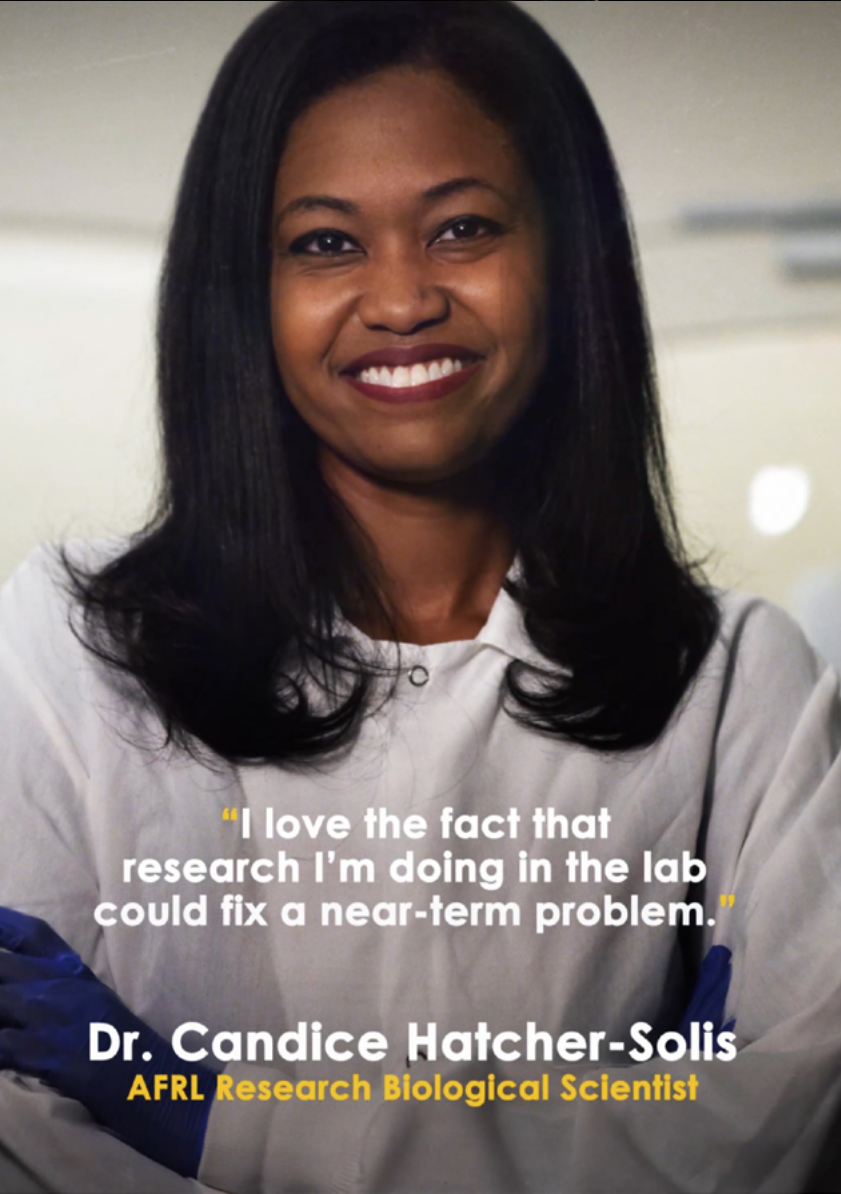
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**DR. CANDICE HATCHER-SOLIS**  
**RESEARCH BIOLOGICAL SCIENTIST**

711th Human Performance Wing  
Air Force Research Laboratory



**"I love the fact that  
research I'm doing in the lab  
could fix a near-term problem."**

**Dr. Candice Hatcher-Solis**  
**AFRL Research Biological Scientist**

VIDEO INTERVIEWS:  
**STEM Professionals**

# Dr. Candice Hatcher-Solis

U.S. Air Force  
**Research Biological Scientist**

Dr. Candice Hatcher-Solis is a civilian research biological scientist with the Air Force Research Laboratory's 711th Human Performance Wing. She's been recognized by the Black Engineer of the Year Awards with the Most Promising Scientist in Government Award, and more recently received the AFRL Science and Engineering Early Career Award. She says she loves the fact that research she is doing in the lab can fix near-term problems.





Cadet David Hatfield inoculates overnight cultures of *S. aureus* (bacteria) at the U.S. Air Force Academy in Colorado Springs, Colo.  
(U.S. Air Force photo by Trevor Cokley)

**EXPLORE SOME  
AVAILABLE STEM  
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OPPORTUNITIES  
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