AFRL
NEW MEXICO
STEM OUTREACH

Inspiring Future Scientists and Engineers

AFRL NM STEM ACADEMY

Star Date: May 2022
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AFRL
THE AIR FORCE RESEARCH LABORATORY
LEAD | DISCOVER | DEVELOP | DELIVER

In This Issue...

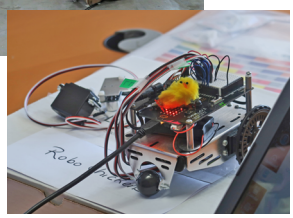
In partnership with:

NEW MEXICO TECH
SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Collaborator:

DoD STARBASE
A Department of Defense Youth Program

Remember, Teachers:
It's never too early to make bussing arrangements for our classes and events!



We made it!
Thanks for a great school year!

The Rocket Report

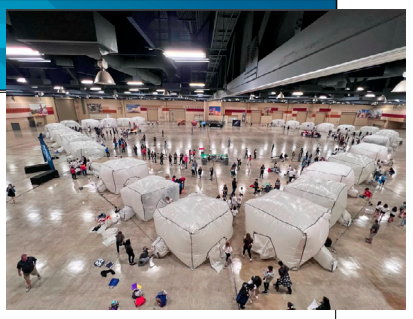
VIVA Accomplished

AFRL's Ms. Jeanne Dailey recently wrote a very nice article about our Mars Vast Interferometer Variable Array (VIVA) Mission Link-Up Day event, which completed the Mission to Mars for the 2021-22 school year:

The Air Force Research Laboratory, or AFRL, STEM Academy held its 28th annual Mission to Mars Link-up Day April 19, 2022, at the Albuquerque Convention Center. It was an especially exciting occasion since the events in 2020 and 2021 were held as virtual gatherings only, due to coronavirus restrictions.

More than 450 fifth graders from 15 New Mexico schools, and home school families, took part in the state's premier STEM event.

"Mission to Mars" is part of the AFRL STEM Academy's K-12 outreach program, which provides hands-on opportunities for students to apply STEM content and make connections to careers.



In addition, 109 students from an-

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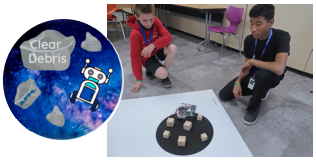
Expo Challenges Robots

Participating middle school student teams from around New Mexico had a number of mechanized challenges to perform at the excellent Robotics Challenge Expo event on 6 May 2022.

With help from some wonderful volunteer judges, they earned colorful lanyard buttons by demonstrating their skills programming Cyber:bot robots, on several challenge courses:

Navigation – No sensors, just coding the robot to "follow the yellow brick road."

Clear the Debris – Students use a Line-Following Sensor to have the robot sweep a "black hole" and push the wooden blocks out.



Line-Following – Students use a Line-Following Sensor to make the robot cruise the streets, obeying all traffic laws.

Pit and Pendulum – Down — steadily down it crept... certainly, relentlessly down! It vibrated within three inches of my robot! Students use the PING Sonar Sensor to help the "Poe little robot" avoid the firey-looking pendulum in the Pit of Despair.

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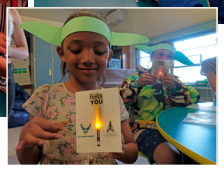
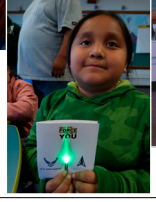
The Fourth Was With Us

On 4 May 2022, our mission was clear: We celebrated Star Wars: May the Fourth Be With You Day with Mission Avenue Elementary students.

The Force was strong with us as we helped them make their own Paper Circuit Lightsabers!





Mission to Mars For Fifth Graders

Mars Vast Interferometer Variable Array (VIVA) Mission 2021-2022

VIVA Accomplished

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other four schools joined the gathering, virtually.

"Over the past 28 years, nearly 20,000 New Mexico students have taken part in this simulated, manned exploration of Mars," said Ronda Cole Harmon, director of the AFRL STEM Academy.

"Students in upper elementary grades are starting to examine their place in the world and their dreams for the future. Providing hands-on opportunities for them to explore STEM topics can introduce them to new possibilities for their futures."

In preparation for Link-Up Day, students spent several months learning about Mars and what it would take to support life on the most comparable planet to Earth. Their goal was to take all they had learned and simulate a visit to Mars.

Dressed in team T-shirts, students presented technical briefings about their life-support systems, verified their meals were nutritious, and built suitable habitats to live in on Mars, to AFRL scientist and engineer volunteers, serving as "mission commanders" and judges.

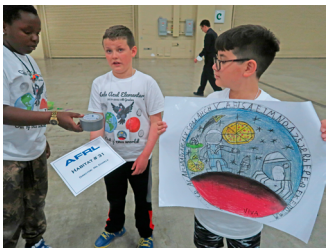
Harmon said Mission to Mars is special in that it "brings learning to life." She explained that students expand their technical knowledge, use their creativity in building their colonies and in creating mission patches and writing sagas, combined with learning about teamwork and opening their minds to STEM careers.

Harmon said she and her team were thrilled to be able to return to an in-person event this year.

"When things shut down in March 2020 due to the pandemic, we had to cancel our 2019-2020 school year Mission to Mars Link-Up Day," Harmon said. "It was very challenging, but we changed course and created a virtual culminating event, though we basically had to start over with individual students, rather than classrooms."

For the 2020-2021 school year, the AFRL STEM Academy planned for an all virtual event with increased participation since they were able to involve classrooms again.

"We revamped our website to have student-focused Mission to Mars information and activities," she said. "The culminating virtual event was better attended and had more student engagement than our first virtual event, though it paled compared to the in-person event. Returning to the Convention Center this year was fantastic for the students, teachers and AFRL STEM Academy!"



Harmon said some of the participating schools were unable to attend this year in-person due to pandemic circumstances, so the academy took what they had learned from two years of virtual events and offered ways for students to participate remotely and interact with students who were part of the in-person event.

"At the end of the day each year, I always ask students about their experience and what their favorite part of link-up day was," Harmon said. "Hands-down they reply, 'building the habitat.' When I ask them 'Why?' the typical answer is 'because we didn't think we could do it.' This year was no exception."

Thanks, Everyone!

We'd like to thank all our AFRL volunteers, our three great Colony Commanders (Lt Col Alex Carothers, Ms. Carri Carothers, and Mr. Jeremy Vorenberg), the Leadership students from AIMS, the wonderful Albuquerque Convention Center staff, the parents, teachers, *our* staff, and all the live and virtual fifth grade Mission to Mars student participants who helped make the 2021-22 Mars VIVA Mission Link-Up Day a success!

And, of course, thank *you*, Ms. Jeanne Dailey, for such a wonderful article!

Yep, no doubt about it...Mars is *back!*

Link-Up Day Date/Site

	Date	Site	Habitats
✓	19 April 2022	Albuquerque Conv. Ctr.	31

DoD STARBASE NM For Fifth Graders

By the Tuesday of the week before the first class in the series, session, or semester, we will ask you for the name, driver's license number/ state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.

Chemistry, Space, and Flight

If you're feeling pressured in DoD STARBASE NM Day 4, relax. It's probably just surface tension.

Students in Day 4 discover that fluids can experience high and low pressure...and air counts as a fluid! So when they squeeze air into a balloon-filled jar, the balloons really feel the squeeze.

Swirling surface tension and air pressure help students move the water from the top bottle to the lower one in a tornado tube, faster than you can say "Auntie Em! Auntie Em!"

In Day 5, students help spherical robots navigate asteroid fields, and then fly the friendly skies on a flight simulator.

Applications

We're accepting applications for next year's DoD STARBASE NM mission. School/Home School application forms can be found on our website here, at the bottom of the page:

https://afrlnm.com/stem/missions/dod-starbase-nm/.

And That's a Wrap

For AIMS and ASE STARBASE 2.0 middle school students, the only thing better than building and launching specification TARC rockets, and nearly qualifying for nationals, is attending a Rocket Launch Wrap Party!

Funny how the pizza slices are kind of shaped like little rockets...

TECH Mission For Middle Schoolers

Technology and Engineering Challenges—Rocketry and Satellites Missions

By the Tuesday of the week before the first class in the series, session, or semester, we will ask you for the name, driver's license number/ state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.

Solder On, Soldiers

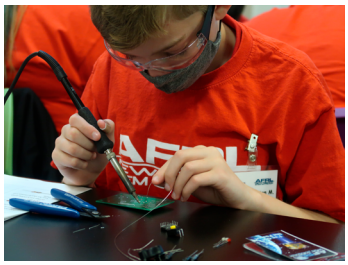
TECH Mission Day 3 students solder on when they use a soldering iron and some soldering wire to assemble LED badges out of a printed circuit board and a few electronic components, like resistors, timers, capacitors, LEDs, battery clips, and power switches.

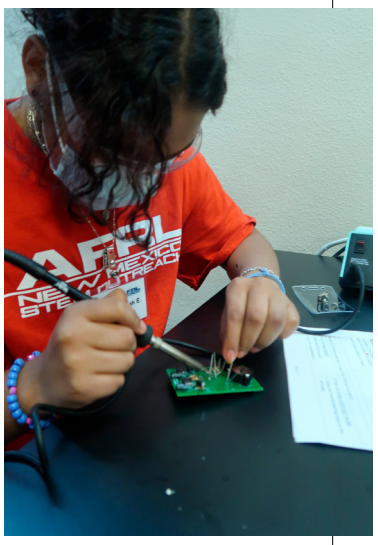
When they're done, they discover they really do have the power!

Applications

We're accepting applications for next year's TECH mission. Middle School/Home School application forms can be found on our TECH Mission page on the website:

https://afrlnm.com/stem/missions/tech-mission/.





Robotics Challenge For Middle Schoolers

Expo Challenges Robots

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Escape the Maze – Students use the PING Sonar Sensor to navigate their robot through a maze.

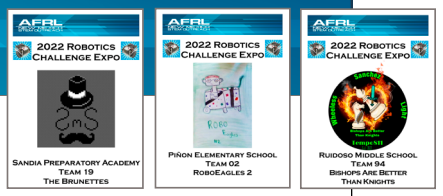
Dance Your Circuits Off – Students use saved code, music, and props to get their robot dancing, complete with sound, lights, motion, and creativity.

John Travolta, eat your heart out!

P2K2-X Quiz Bowl – Students test their robotic knowledge in a game-show-like format.

Flashy Chassis Pageant – The Best-Dressed Robot competition.

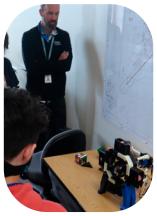
Robotic guests included a robot Rubic's Cube solver, a simulated Mars Rover, Wall-E, and some "Robot Rumble" skill challengers.



Flashy Chassis Pageant Winner: Team 19, The Brunettes. Integrity Award: Team 2, RoboEagles2. 2022 Robotics Challenge Champions: Team 94, BishopsAreBetterThanKnights.

STEM winner: Everyone!

Thanks to all the staff, volunteer judges, schools, students, robots, and robotic exhibitors who helped make this year's 2022 Robotics Challenge Expo a success!



STEM Challenge For High Schoolers

More Symposium Pics

Here are some more pictures from our egg-cellent STEM Challenge Symposium on 5 April 2022. Live events *rock!*

AFRL NEW MEXICO STEM OUTREACH

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https://www.youtube.com/channel/UC-QuOSd1XTkYuXPONZwlAIHQ/videos

Important Terms and Acronyms

AF: Air Force

AFB: Air Force Base

AFRL: Air Force Research Laboratory

AFRL NM: AFRL New Mexico (AFRL/RD and AFRL/RV), on KAFB

AFRL/RD: The Directed Energy Directorate of the AFRL

AFRL/RV: The Space Vehicles Directorate of the AFRL

DoD: Department of Defense

KAFB: Kirtland Air Force Base, Albuquerque, NM

MM: Mission to Mars

S&Es: Scientists and Engineers

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

USAF: United States Air Force

USSF: United States Space Force

VIVA: Mars Vast Interferometer Variable Array Mission 2021-2022

Remember, Teachers:
Get those EPA Modification forms in!

AFA Rebrands

After 76 years, the Air Force Association (AFA), the "pre-eminent voice for American air and space power," is adopting a new name and a new logo. Per their website:

"AFA was founded in February 1946, more than a year before the Air Force itself became an independent service in September 1947.

Its purpose was to advocate for air power, and educate on *why* air power was the foundation of a strong national defense."

AFA's new name, the "Air & Space Forces Association" will "better match its mission," to support the "Total Air Force," and now the Space Force as well.

Their new logo combines elements of the original AFA logo, such as the "Hap Arnold Army Air Corps Star," with elements of the Space Force logo, namely the Delta and Polaris (the North Star), interlinked in such a way as to form what is now undoubtedly the coolest logo on the *planet*.

Not to worry, though...they're retaining the familiar "AFA" acronym and www.afa.org website!

Summer STEM Camps and Stuff

Registration is open now for AFA's *StellarCamp*, a space-system-design summer STEM camp for rising 8th through 12th graders. No prior experience required.

AFA's CyberPatriot *Elementary School Cyber Education Initiative* (ESCEI), a set of three K-6 interactive cybersecurity learning modules, is available now for *free* download.

STEM Grants

AFA's *Educator Grant* program promotes K-12 clasroom aerospace education with up to $500 grants. Applications accepted 1 September–15 December 2022.

AFA also offers $250 grants twice a year to Civil Air Patrol (CAP) and Air Force JROTC units for STEM and aerospace education.

See www.afa.org for more information on AFA grants and programs.

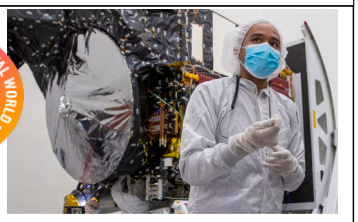
Luis D. and Psyche

It's the most metal mission ever! In August 2022, NASA plans to launch a spacecraft called Psyche, on a mission called Psyche, to an asteroid called Psyche.

The asteroid is orbiting the Sun between Mars and Jupiter. The mission aims to study its metallic nickel-iron core, as scientists think this could be representative of early planet formation.

The spacecraft will also test an onboard Deep Space Optical Communications (DSOC) laser, for communicating over distances up to 2.5 astronomical units (AU).

One of the team leaders on the Psyche mission is NASA systems engineer Luis Dominguez.

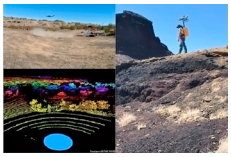


A proud first-generation college graduate son of immigrants from Mexico and Honduras, his seventh grade interest in flight and science eventually led him to the Jet Propulsion Laboratory (JPL). He worked on the Mars *Curiosity* and *Perseverance* rovers before joining the Psyche team.

Named one of CNET en Español's *20 Most Influential Latinos in Technology* in 2017, he enjoys telling students about what he does.

See https://psyche.asu.edu/.

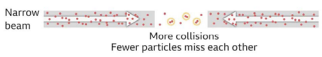
May the Third, Fourth, and Fifth Force Be With Us



The *Kinematic Navigation and Cartography Knapsack* (KNaCK) is a backpack sensor NASA has developed. It maps uncharted or low-visibility terrain, in the third dimension, on the surface of the Moon (and presumably, on Mars one day).

The fourth private mission to the ISS, the Crew-4 Mission, waited until after the AX-1 Mission's historic first four

all-civilian astronaut crew splashed down safely recently, before heading to the space station. TL:DR; Fourth Flies Following First Four First.



CERN's Large Hadron Collider recently got an upgrade that may help it find the "fifth force of nature" (gravity, electomagnetism, and two nuclear forces being the other four).

Coming Next Issue...

- Another great year of STEM!
- Hopefully, it will be live.
- Definitely, it will be lit.

Watch for it!