



The Rocket Report

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In partnership with:



Collaborator:



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



Mars STARS Mission Accomplished



Missions to Mars are on everyone's mind, and stars are in their eyes!

- NASA has opened up its *Sample Return Mission* proposals to include private companies such as SpaceX, in hopes of getting the job done cheaper and sooner.
- NASA's one-year *Crew Health and Performance Exploration Analog (CHAPEA)* Mars mission simulation ends 6 July 2024. *CHAPEA II* starts spring 2025.



- NASA's *Human Exploration Research Analog (HERA)* just started another 45-day Mars mission simulation on 10 May 2024.
- Also, on 25 April 2024, over 1,000 fifth graders completed the

Safeguarding Through Asteroid Redirection Spacecraft (STARS) Mission, simulating establishing a Martian colony supporting up to 30 impactor

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30th/20th Anniversaries Celebrated

While Link-Up Day activities were going on downstairs at the Albuquerque Convention Center on 25 April 2024, dignitaries and other invited guests were upstairs celebrating two anniversaries. Namely, the **30th Anniversary of our Mission to Mars program**, and the **20th Anniversary of our DoD STARBASE NM program**.

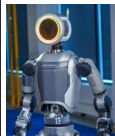
In a room stylishly decorated with



colorful laser-cut acrylic rockets, and cubes with the two programs' anniversary logos laser-etched into their sides, attendees listened to speakers including NM Lt. Governor Howie Morales.



Robots Challenged at EXPO

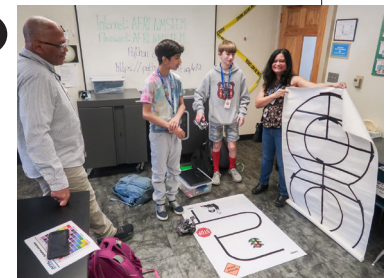


Robots are everywhere! Among other developments, Boston Dynamics recently upgraded its "parkour-capable" *Atlas* robot to an all-electric model, and Mentee Robotics has created an AI "natural-language driven" robot called Menteebot "that you can mentor."

But neither of those robots can hold a candle-sized capacitor to the sheer STEM fun we had host-

ing the **2024 Robotics Expo** on 10 May 2024! Twenty-eight teams from 9 schools and a homeschool attended:

- Albuquerque Academy
- Albuquerque School of Excellence
- Canon Christian Academy
- Christ Lutheran School
- Desert Willow Family School
- Homeschool



- Jefferson Middle School
- Piñon Elementary School
- Ruidoso Middle School
- St. Mary's School Belen

More recent events are in STEM Bytes, page 4!

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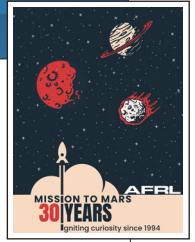




Mission to Mars

For Fifth Graders

Mars Safeguarding Through Asteroid Redirection Spacecraft (STARS) Mission 2023-2024



Mars STARS Mission Accomplished

Continued from page 1

spacecraft protecting Mars from asteroids, at our **30th Anniversary Link-Up Day event** at the Albuquerque Convention Center!

Students worked all throughout the school year in their classrooms, preparing for their trip to Mars. They:

- Designed uniforms and mission patches;
- Planned and packed nutritious, weight- and space-saving lunches;
- Studied Mars Facts and designed Life Support Systems;
- Wrote and rehearsed a saga song/dance routine about their journey to Mars;
- Determined their colony's location on Mars; and
- Made mini-habitats and measured and cut their full-size plastic habitat pieces.

On Link-Up Day, students split into a blue team and a silver team.

Blue team students demonstrated readiness for the mission and re-



ceived Crew Mission Log points at holding stations that checked the students' life support system models, Mars facts, and uniforms.

Meanwhile, silver team students went with their Habitat Director (teacher) to their habitat site to mass their astronaut lunches and begin laying out their pre-fabricated plastic habitat pieces for construction.

Once blue and silver student teams regrouped into crews at their habitat site, they performed their sagas. Student crews not present at the Convention Center participated virtually.

Using their 6-mil plastic pieces, grey tape, and a box fan, the stu-



dent crews built colonies of habitats to simulate what scientists would live and work in on the Red Planet. Including crews participating virtually, students built over 70 habitats this year!

These inflatable habitats are similar to some NASA has considered using for Mars and outer space travel. They're lightweight and compact for transport, but expand to sizable rooms on Mars.

Volunteers from KAFB and other community organizations assisted at the holding stations. *Colony Commanders* at each colony helped keep the Habitat Directors (teachers) and students on track.

Students ate their prepared space lunches inside the habitats, massed the lunch waste, and cut the sealed *connecting tunnels* for a Habitat Walk: Knowledge Quest.

Linking the habitats together in this way,



forming a connected neighborhood within the colony, is how Link-Up Day got its name!

During all this, Marvin the Martian (AFRL's very own Dr. Diana Loree), was walking around taking pictures with the students, and listening for Earth-shattering *kabooms*, while dignitaries celebrated the Link-Up Day 30th and STARBASE program's 20th anniversaries upstairs.



We'd like to thank all the volunteers, staff, teachers, students, and of course, our wonderful friends at the Albuquerque Convention Center for making the 2023-2024 Mission to Mars 30th Anniversary Link-Up Day, the STARS Mission, the most star-studded anniversary mission ever, and such a huge, Martian-sized success!

Sign up for next year's Mission to Mars at www.afrlnm.com/stem/missions/mission-to-mars.

Link-Up Day Date/Site

Date	Site	Habitats	Anniversary
25 April 2024	Albuq. Conv. Ctr.	67	30th



TECH Mission

For Middle Schoolers

Technology and Engineering Challenges—Rocketry and Satellites Missions

Solder Power

TECH Mission Day 3 students learn how to solder electronic components, like resistors, timers, capacitors, LEDs, battery clips, and power switches, to a printed circuit board (PCB).

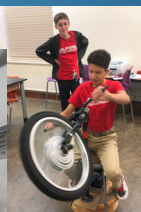
When they're done, they have a badge depicting an orbiting satellite with blinking red and yellow LED lights, which reads "I've got the power!" And now they have the power, and know-how, to solder.

It's shocking what a hair-raising tale it is to see students getting a charge out of experimenting with a Van de Graaff Generator.

After learning how solar weather can damage the electronics in space satellites, students take a moment to explore *angular momentum* and the *moment of inertia*.

Students explore these concepts with hand-held gyroscopes, and by sitting on a spinning stool with weights in their hands to make a *human gyroscope*.

Middle School/Home School application forms for next year's TECH mission can be found here: www.afrlnm.com/stem/missions/tech-mission.



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.



Robotics Challenge For Middle Schoolers



Robots Challenged at EXPO

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Participating teams pitted themselves and their robots against navigation programming, line-following sensor, and sonar sensor courses, a robotic dance exhibition, a "Flashy Chassis" contest, and a Quiz Bowl.



Navigation programming involved programming the Cyber:bot robot to navigate a yellow path through various obstacles, including toy dinosaurs, rockets, little trees, and even the Heihei chicken from *Moana*.

Students attempting the Clear the Debris and Line-Following courses used their robot's QTI Line-Following sensor to push wooden blocks out of a black circle, and to follow a

"street" with a traffic signals and a stop sign, through a small "town."

Students attempting the Escape the Maze and Pit of Despair courses took advantage of their robots' sonar "PING" sensors (think bat-style echolocation) to avoid the walls of an acrylic maze, and the up-and-down movements of a "pendulum" which blocked the robots' path.

Students voted for the best-dressed robot in the Flashy Chassis "beauty pageant," busted out some robotic moves in the *Dance Your Circuits Off!* portion, and tested their Cyber:bot robotics knowledge in a game show-like Quiz Bowl.

Along the way, students received Integrity points for exhibiting exemplary behavior towards teammates and others during the Expo.

Flashy Chassis Pageant Winner: Albuquerque Academy Team 08, The Coders, with their clever tank-decorated robot.

Integrity Award Winner: Christ Lutheran School Team 06, The Cardigans

Robotics Expo Champions: Jefferson Middle School Team 73, Firewall

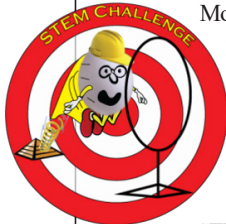


Congratulations to all the 2024 Robotics Expo winners, and thanks to all the staff, volunteer judges, schools, students, robots, and robotic exhibitors who helped make this year's 2023 Robotics Challenge Expo a success!

Register for next year's Robotics Challenge at www.afrlnm.com/stem/missions/robotics-challenge.

STEM Challenge For High Schoolers

Symposium Egg-tacular

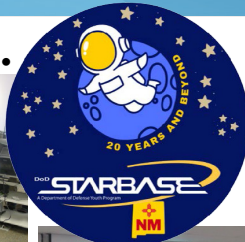


More egg-celent pictures from the STEM Challenge Symposium on 11 April 2024!

Registration for the 2024-2025 STEM Challenge can be found on our website at www.afrlnm.com/stem/missions/stem-challenge.



DoD STARBASE NM For Fifth Graders



STARBASE Aviation Then...

20 years ago, DoD STARBASE NM started doing Aviation and Flight Sim activities with students...

...and Now

...and we're still doing it today in Day 5 Aviation day of DoD STARBASE NM! (The Flight Sim monitors *have* gotten a bit thinner!)



Prior to the first session, 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.



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Mr. Steve Burke, Technical Writer.

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

STARS: Mars Safeguarding Through Asteroid Redirection Spacecraft Mission 2023-2024

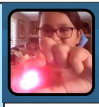
STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

USAF: United States Air Force

USSF: United States Space Force

Remember, Teachers:
Get those EPA Modification forms in!



DoD STARBASE NM (continued)

Grow and Advance



The great STARBASE Director Ms. Esti Gutierrez, starting in 2009-10, polished our STARBASE program so well, it grew to include STARBASE 2.0, then 3.0, and now Advanced, before turning the Advanced reins over to Ms. Tina Hansen.

And now look what that got us! A successful year of STARBASE Advanced, and Albuquerque Institute of Math and Science (AIMS) Team Bravo qualified (only 100 teams do) to compete in Nationals at the [American Rocketry Challenge](#) (ARC) on 18 May 2024, with a score of 1 (perfect would have been 0).



STEM Bytes

Other Recent Events

JSHS Symposium

The 62nd National Junior Science and Humanities Symposium (JSHS) was held at the Embassy Suites Hotel in Albuquerque, NM from 1-4 May 2024, for 238 qualifying high school students. It encourages the future generation of scientists and engineers and celebrates student achievement in the sciences.

On 3 May 2024, JSHS students interacted with a number of our STEM activities, including soldering little LED circuit board bugs, making a paper circuit lightsaber, making a laser bounce around a maze, making a paper satellite, and making their own pathway through STEM!



NM Women in STEM

Our staff recently attended the NM Women in STEM summit and moderated one of the panels there.



Signing Day

Fashioned after athletic signing days, high school seniors signed "letters of intent" to their chosen STEM field and school on 14 May 2024 at STEM Signing Day.

For details, see www.qstation.tech/stemevents.



This Issue is Dedicated To... Gerald Mora

Gerald Lee Mora, former Director of AFRL NM STEM Academy, born 14 December 1946, [passed away](#) at his home in Sandia Park, New Mexico, on 11 April 2024—the day of our STEM Challenge Symposium—at the age of 77.

Gerald was instrumental in establishing what was once called the AFRL Technology Transfer for Education (TTE) Program, then AF STARBASE La Luz...and now AFRL NM STEM Academy. Mission to Mars and DoD STARBASE NM are celebrating big anniversaries this year, largely because of the work Gerald put into establishing and maintaining these and other



STEM programs for us.

A Navy Vietnam vet, UNM mathematics graduate, and entrepreneur, Gerald impacted countless NM K-12 students as Director of the NM TTE Support Group and NM Partnership Intermediary for AFRL at KAFB. His honors and recognitions include the 2001 New Mexico Distinguished Public Service Award—for developing this program.

Thanks for everything, Gerald!



Coming Next Issue...

Another great year of



Watch for it!