National Aeronautics and
Space Administration

INSPIRE - ENGAGE - EDUCATE - EMPLOY

The Next Generation of Explorers

Artemis Exploration Activities: Software, Simulations and Graphics for Mission Success

Space Exploration Educators Conference
February 9, 2024

Today's Agenda

- Welcome, Introduction, and Overview
  5 minutes
- NASA Software, Simulation and Graphics Presentation, Q/A w/ Angelica Garcia
  25 minutes
- Artemis Student Challenges and Student Design Challenges
  12 minutes
- Coding Activities and Resources
  7 minutes
- Next Gen STEM Overview, Resources and Opportunities
  8 minutes
- Conclusion, Q/A and Wrap-Up
  3 minutes

NASA Onward and Upward Video:
https://www.youtube.com/watch?v=IGuHErKAiHs

NASA Onward to the Moon Video:
https://www.youtube.com/watch?v=_tdsia6EZY8

NASA Software, Simulation and Graphics Presentation

Angelica Garcia, NASA Simulation and Graphics Capability Manager

Artemis Student Challenges and Student Design Challenges

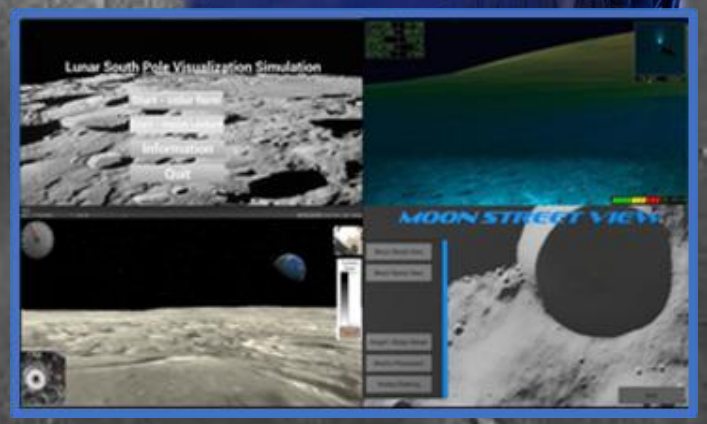
Artemis Student Challenge Video: https://youtu.be/Xn4JTR1n96c

NASA App Development Challenge (ADC)

What to Expect:

- In the ADC, teams of middle and high school students code solutions to technical problems presented by NASA.
- Middle school and high school student teams create a video showcasing their application visualizing one of 13 Artemis III Landing Regions near the lunar south pole utilizing provided NASA data.
- Both levels will plot a path of exploration given a landing site and a destination site not to exceed 15 degrees of slope and identify locations for 10 communication checkpoints.
- Middle school teams will have the option of using a Digital Elevation Model (DEM) and instructions on building a visualization or use the raw data to produce their own. High school teams will calculate and display azimuth and elevation angles.
- All work on the application must be student-led, occur during the design phase, with no prior year work accepted.

2024 ADC Registration Opens in August



Sept. 27 – Registration Closes

Oct. 11, Nov. 8, Nov. 29 – Live Events

Dec 13. – Video Submission

Top Teams Announced

September | October | November | December | January | February | March | April

Oct. 2– Teacher Training @ 6 p.m. CST

Oct. 4 – Challenge begins Live Kickoff

Selected Team Interviews

April 15-18 – Culminating Event

https://www.nasa.gov/learning-resources/app-development-challenge

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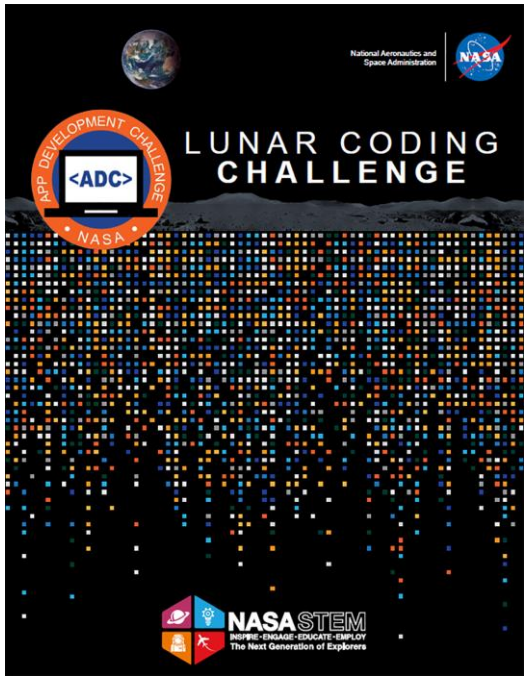
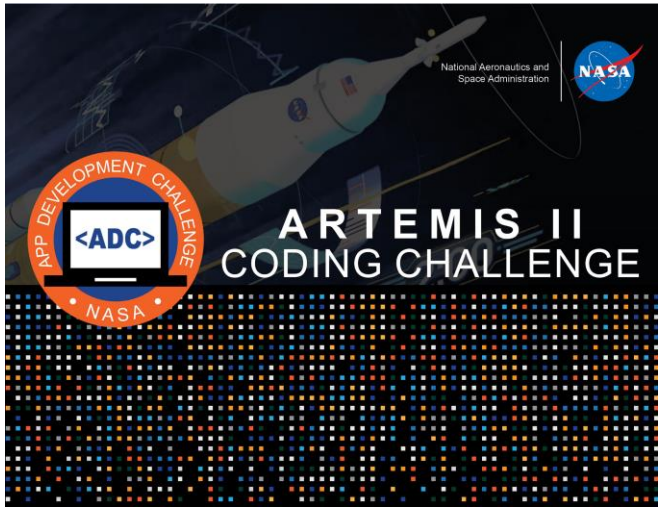
Coding Challenges: Artemis I and Artemis II; and World Quantum Day

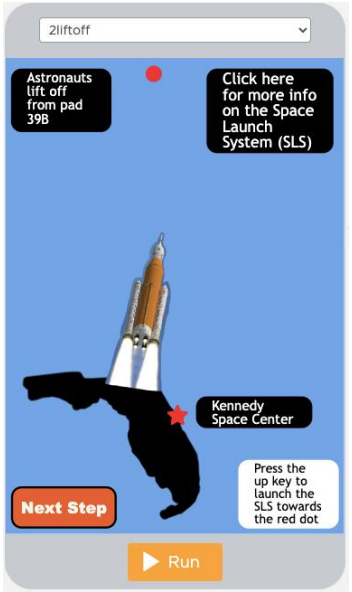
The ADC team has started a series of middle school level classroom coding challenges to support Code.org, Hour of Code. The first “Lunar Coding Challenge” in support of Artemis I and the second “Artemis II Coding Challenge in support of the Sept. 2025 Artemis II mission. Go to Code.org, Hour of Code Activities, in “Search” type in “NASA”

Both activities, with instruction guides, available on the NASA ADC Website: Classroom Coding Challenges.

World Quantum Day, April 14th: https://worldquantumday.org/.
Quantime Activities: https://q12education.org/quantime







Kibo Robot Programming Challenge (Kibo-RPC)

The Kibo Robot Programming Challenge (Kibo-RPC) is an educational program in which students solve various problems by coding free-flying robots (Astrobee) using their programming skills in a simulation environment and in the Final Round on the International Space Station (ISS). The competition presents tasks/obstacles for students to solve using the Kibo module as a game space.

- JAXA Kibo-RPC website: https://jaxa.krpc.jp/
- Call for high school and undergraduate student participation in teams of 3 – 6 members: Feb.20 – May 13, 2024, simulation testing starts April.
- U.S. Preliminary Round: July 11, 2024 at JSC (virtual).
- International Space Station Final Round: November 2024 Selected teams will have their code sent to and tested aboard the space station utilizing Astrobee.
- Winning U.S. team could potentially travel to Tsukuba Space Center in October for the International Final Round. (max 4 team members)
- **Registration begins February 20th, via NASA STEM Gateway.**
- Questions about this opportunity, email: jsc-kiborpc@mail.nasa.gov

NASA Spacesuit User Interface Technologies for Students

NASA Spacesuit User Interface Technologies for Students (SUITS) is a coding challenge in which NASA presents a set of challenges to undergraduate and graduate students to develop user interfaces for potential use in future spaceflight.

Through participation in NASA SUITS, students engage in authentic project-based learning as members of the Artemis Generation. With Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before. Once proven, these technologies will allow humanity to achieve the next great leap, from Moon to Mars!

Sept. 7 - Registration Begins

Nov. 2 - Proposals Due

Dec. 7 - Team Selection

Jan. 11 thru May 9- Development and Mentorship

May 19-23 - Test Week

September | October | November | December | January | February | March | April | May

Sept. 12, 20, 28, and Oct. 17 - Informational Sessions

Regular Briefings with NASA Subject Matter Experts and SUITS team members.

Visit:

https://go.nasa.gov/NASASUITS

NASA SUITS 2024 Mission

1

Localized Mission Control Center (LMCC):
-Design a console user interface for managing operations on the Martian surface. Including spacesuit vitals, crewmember vitals, camera views, maps, scientific aids, and rover controls.

2

Rover Control:
-Control a rover from the LMCC.

3

Spacesuit Displays and Controls:
-Allow the crewmember to view vitals, as well as navigation and scientific aids.
-Allow the crewmember to control aspects of their spacesuit.

Computer Science and Coding Activities and Resources

Search NASA STEM Opportunities and Resources

NASA Learning Resources: https://www.nasa.gov/learning-resources

Resource Search Directory: https://www.nasa.gov/learning-resources/search/

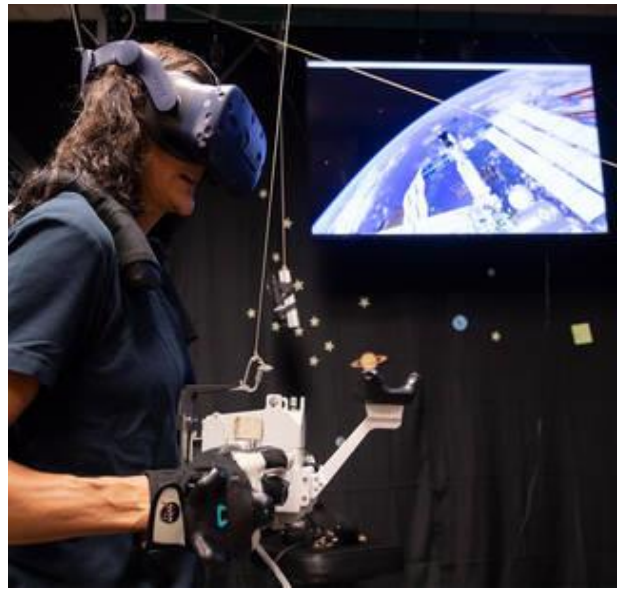
Search for educator/student resources by,

- education opportunity (Ex: professional development, citizen science, funding opportunities, international participation, etc.)
- grade
- subject
- type (videos, posters, lesson plans)

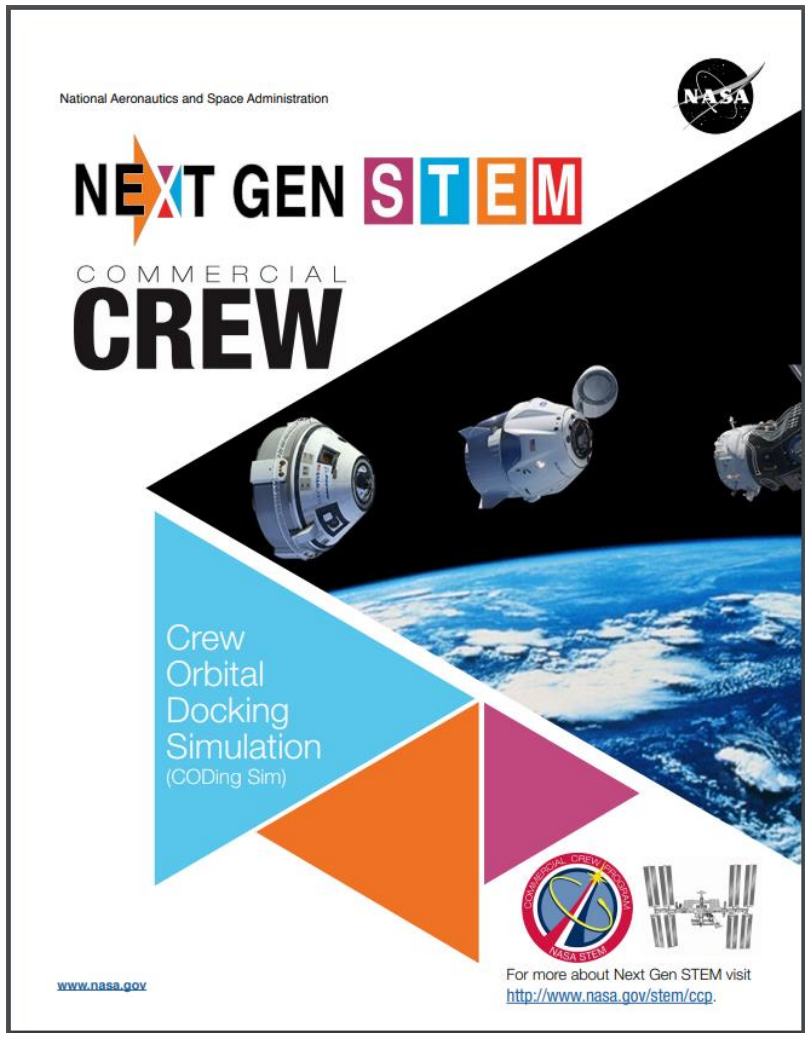
Example: middle/high school computer science search produced 55 unique results.

NASA STEM Stars: Virtual Reality Training Lab, featuring Angelica Garcia

JPL coding activities website: https://www.jpl.nasa.gov/edu/learn/tag/search/coding



Crew Orbital Docking Simulation: CODing Sim



Beginner and advanced student programmers use Scratch, Snap! or another programming language to create an interactive simulation of a spacecraft docking to the space station.

The activity guide includes recommendations for beginner and advanced level programming. The advanced option is more appropriate for students with experience using block-based programming languages.

Middle and high school activity. Additional files required to complete the activity are located on the activity website.

CODing Sim Activity Website
CODing Sim Guide

Deep Space Communication – Educator Guide

NASA SCaN Student Zone

Middle school level education guide created in collaboration with NASA's Space Communication and Navigation (SCaN) team. Guide includes four standards-aligned activities to help students learn about the fundamental concepts of communication technology.

Deep Space Communications was published by NASA's Office of STEM Engagement as part of a series of educator guides to help middle school students reach their potential to join the next-generation STEM workforce.

The activities can be used in both formal and informal education settings as well as by families for individual use.

Each activity is aligned to national standards for science, technology, engineering, and mathematics (STEM), and the NASA messaging is current as of September 2021.

Activity Page: https://www.nasa.gov/stem-content/deep-space-communications/

Deep Space Communication Educator Guide

EarthRise

Welcome to Earthrise!

Earthrise will leverage NASA's digital community of practice for educators, and a broad network of learners associated with NASA's federal partners, to provide K-12 educators and learners with a focused, monthly collection of Earth and climate science resources from across the federal enterprise. Educators are invited to register for this monthly engagement, with the first monthly collection of resources to be delivered in January and then monthly throughout the remainder of 2024.

Our primary focus is centered around access to Earth and climate resources for the K-12 community and we plan to set up a regular working group to inform plans for carrying this through the summer and beyond as well. This initiative began with intent to move the needle on educating our nation's children and increasing their understanding of Earth and climate science, and the importance of protecting our home planet

https://www.nasa.gov/stem-content/earthrise/

NASA’s Next Gen STEM Project Overview

CONNECTS, Engages, Professional Development, and Additional Activities and Resources

Next Gen STEM Engaging K-12 Students to Build the Future STEM Workforce

NASA's Value Proposition in Pre-College STEM Engagement

NASA is universally known for its exciting mission and technical excellence. Children are drawn to the wonders of flight and space. NASA employees were drawn to the agency by that excitement and are a force for inspiring and equipping the next generation.

Next Gen STEM contributes to growing a diverse future STEM Workforce through

- Student Engagement
- Educator Support
- Strategic Partnerships
- Competitive Awards

With programming that provides

- Real connections to NASA's missions and people
- Evidence-based, standards-aligned content and practices
- Low barrier access to all NASA K-12 offerings

NASA CONNECTS Educator Community of Practice

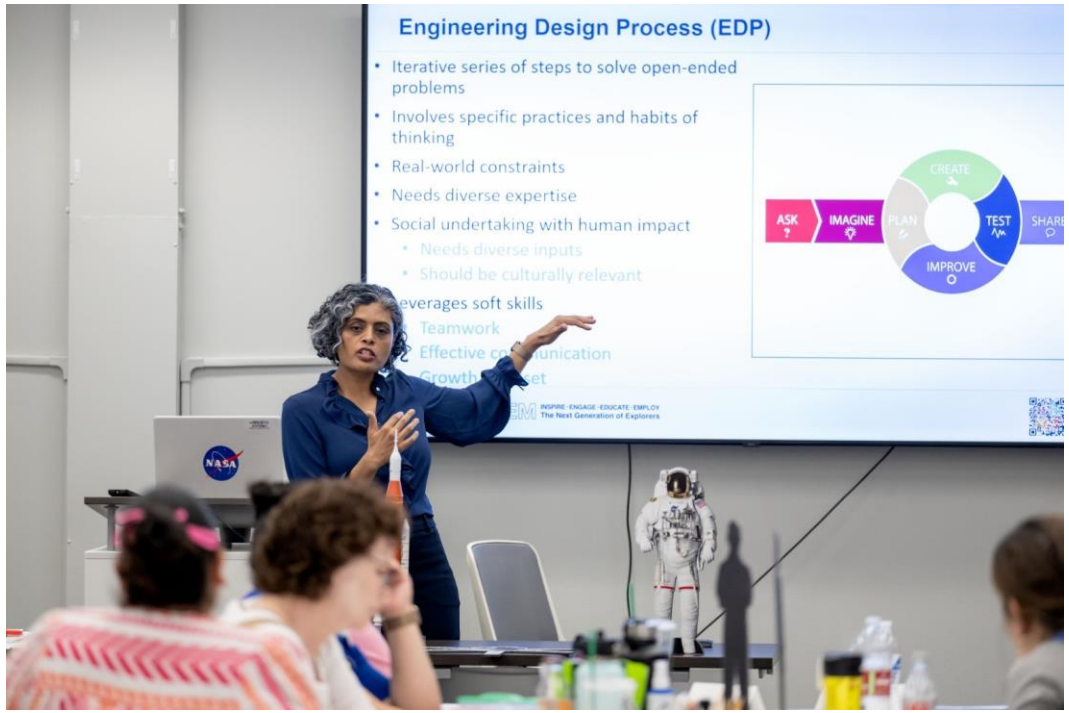
NASA CONNECTS (Connecting Our NASA Network of Educators for Collaborating Together in STEM) is an online, professional learning community for educators to collaborate with each other and NASA.

- Join Discussions & Connect With Others
- Ask Questions & Get Answers
- Share & Discover New Best Practices
- Download Free STEM Products
- Learn About Upcoming Events
- See The Latest Opportunities
- Museum & Informal Education Alliance

Scan to Join CONNECTS!

NASA's Educator Professional Development (EPD)

NASA's Educator Professional Development (EPD) connects **formal and informal K-12 educators** with enriching opportunities designed to support educators in STEM teaching with real-world connections to NASA missions. Through our events and community of practice, we provide sustained opportunities for educator development, offering access to a wealth of NASA mission resources and programs. Led by NASA education specialists, our events encompass both synchronous and asynchronous formats, including facilitating engagement with NASA subject matter experts (SMEs).



Join us to learn with NASA team members through virtual and in-person opportunities in real-time. View the schedule and register for upcoming events in NASA STEM Gateway.

- Monthly Webinars
  - **February 22 – Earth Ecosystems: Setting the PACE with NASA's PACE Mission**
- Next Gen STEM 101 Educator Workshops
- Conference Presentations
- On-demand Events

For general inquiries, please email us at hq-epd@mail.nasa.gov.

NASA Engages – An online tool to connect NASA Experts to events

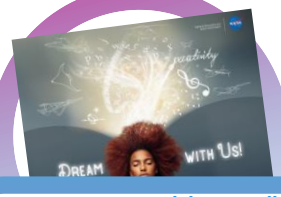
https://my.nasa.gov/engages

NEXT GEN STEM RECENT CONTENT RELEASES

First Woman Camp Experience Guide

Artemis Camp Experience Guide

Advanced Air Mobility Toolkit



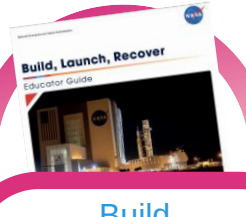
Dream With Us (in collaboration with ARMD)

Eclipse Toolkit

Artemis Generation Spacesuit Curriculum Guide

Earth Camp Guide

Lunar Surface Exploration Guide



Build, Launch, Recover Curriculum Guide

STEMonstrations:

Conservation of Mass

Space Art

Space Communication

Photosynthesis

Properties of Water

5E Lesson Plans

Solar System Scroll (12 total lessons)

Upcoming 2024 Releases:

-First Woman Camp Guide 2nd Edition
-NASA Exploration Experience

NASA SPARX (Sparking Participation And Real-world EXperiences in STEM)

NASA SPARX

Utilizing evidence-based practices* to meet K-12 educators and students where they are to:

- Engage and spark STEM interest
- Empower STEM identity
- Enable STEM pathways
- Encourage STEM careers

*STEMworks Design Principles

NASA SPARX Benefits

Educator Benefits:

- **Content:** Standards-aligned, hands-on, engineering design
- **Professional Development**: live and on-demand
- **Community of Practice**: online network of educators
- **NASA Education Specialists**: direct access for support
- **Student webinars with NASA experts**: connect students with live NASA scientists and engineers
- **Flexible Dates**: Program last majority of school year (Sept-March); Fit into your curriculum in a way that works best for you!

Register at https://stemgateway.nasa.gov/public

Email SPARX@mail.nasa.gov with questions.

This is the Artemis Generation Video:
https://www.youtube.com/watch?v=O7dNT2qA1dw

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