



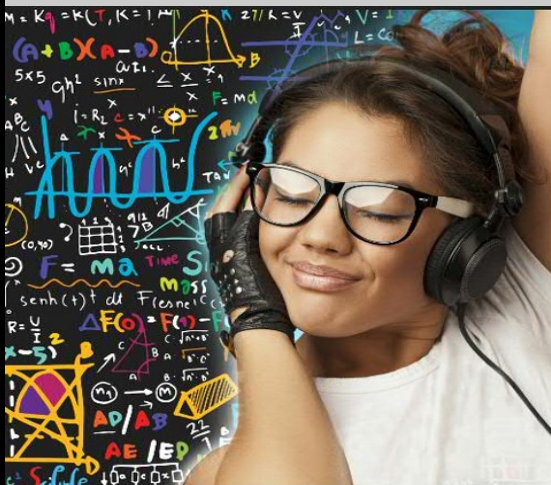
C5ISR CENTER STEM@Home

APPROVED FOR PUBLIC RELEASE

Welcome to STEM@Home!

As we maneuver the challenges of the COVID-19 epidemic, we strive to continue to make STEM accessible to all.

The STEM@Home Newsletter is intended to be a resource to provide engaging and educational activities that can be done with minimal materials and a whole lot of imagination.



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VOL 2, Issue 6

Brain Teaser



Riddle:
“Five without
four is Iron.”

How?

Answer on Page 2



ARMY EDUCATIONAL
OUTREACH PROGRAM

The Army Educational Outreach

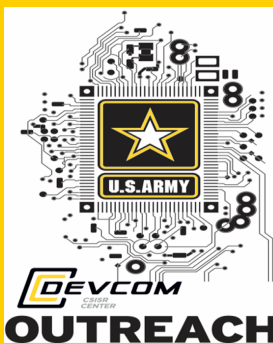
Program (AEOP) offers STEM programs for students at every level of their STEM Journey. From competitions, to enrichment activities—from apprenticeships to scholarships, AEOP has a program that is right for you.

WWW.USAEOP.COM

**THE NEXT
GENERATION OF
INNOVATORS**

Now is a great time to get involved in STEM...

The C5ISR Center Educational Outreach Program is a collection of kindergarten through college-level programs designed to give students access to opportunities in the areas of science, technology, engineering, and math, or STEM.



For more information about our STEM Outreach Programs, visit us on the web:
[https://c5isr.ccdc.army.mil/
student_programs/](https://c5isr.ccdc.army.mil/student_programs/)

STEM Challenge: Tallest Structure

Reach for the Stars!

Using just a deck of cards, build the tallest tower you can and measure it using inches.



Materials:

- Deck of cards
- Ruler
- Flat surface

With the help of a parent or guardian, please send your answers to us via email at usarmy.apg.devcom-c5isr.mbx.outreach@army.mil to have your amazing tower featured in the upcoming March STEM@Home Newsletter.

Do you have what it takes to be a STEM leader of the Future?

AEOP Apprenticeships and Fellowships help you gain the skills and experience you need today to prepare for the STEM careers of tomorrow. Programs are available for students in high school and college as well as for enrolled in graduate and post-doctoral programs

The future is bright for careers in STEM. STEM careers are projected to continue to grow at a faster rate than non-STEM careers in the next decade. Make sure you have the skills you will need.

Find out more at <https://www.usaeop.com/apprenticeships-fellowships/>



QUESTION: Why does Cinderella never win the Olympics?

ANSWER: She has a pumpkin for a coach and runs away from the ball.

Answer from Page 1: Take the two middle letters of the word five, which is the Roman numeral four (IV). Five without four is Fe. Fe is the chemical element name for iron.

Resource: <https://www.riddlesandanswers.com/tag/science-riddles/>

STEM Challenge



Olympic Torch Challenge

The Olympic torches are modern inventions used in both the summer and winter Olympics during the torch relay that has been inspired by culture from ancient Greece. The Olympic torch relay commemorates the start of the Olympic Games and symbolizes a message of peace and friendship. A new torch is designed for every Olympics, with a unique design that represents the host country. The torch is designed to resist the effect of rain and winds so that it can remain lit until the closing ceremony.

Mission:

The International Olympic Committee is in search of a new design for the Paris 2024 Summer Games. They are asking engineers or scientists to submit their planning designs and a picture of a prototype in order to select the best torch design for the upcoming

SAFETY FIRST!



You must have adult supervision to complete this activity

Materials:

- Popsicle Sticks
- Paper, cardstock, or cardboard
- Newspaper
- Paper towel roll tubes
- Small plastic cups
- Aluminum foil
- String or rubber bands
- Pipe cleaners
- Straws
- Tape
- Glue
- Plastic spoons
- Other useful items in your home

Requirements:

- Torch must be a minimum of 12 inches in length
- Allows the holder to not get burned
- Must be able to withstand weather conditions

There is **NO FLAME or FIRE** used to complete this activity!

Design Process:

ASK: What is the problem you need to solve? A new torch design for the upcoming Summer Olympics.

IMAGINE: Brainstorm and decide on one idea. How will your Olympic torch work?

PLAN: Draw a picture of your device. What will your Olympic torch look like?

CREATE: Use the materials to create a prototype of your torch design.

IMPROVE: How could you improve your torch design?

Questions to Ask: If you had more choices of materials, what would you use and why?

What makes your Olympic torch design stand out from other designs?

SHARE: Show your family and friends your Olympic torch design and explain how it works.



SHARE

[Facebook.com/DEVCOM.C5ISR](https://www.facebook.com/DEVCOM.C5ISR)

#C5ISRCenterSTEM

***You must have permission from your grownups before using social media.*

STEM in the News

A Hiking Robot?!

Whether we realize it or not, we use and interact with robots almost every day. There are robots that build cars, assist and perform surgeries, and even help in restaurants to prepare and chop food. Some of us even have robots in our homes like Alexa, Roombas, and Robomow. Now, we have robots that can take to the wilderness and go hiking!

A team of computer scientists and engineers at Swiss Federal Institute of Technology Zurich, a research university in the city of Zurich, Switzerland, have built a robot that can traverse hills, descend steep slopes, and avoid rocks and roots along the way. This is all possible because of a robot, named ANYmal, is programmed to use control technology and machine learning.

The new control technology was invented and tested by a team led by robotics professor Marco Hutter. The robot was programmed to learn and combine visual perception of its environment with a sense of touch, based on direct leg contact. This allows ANYmal to navigate rough terrain faster and more efficiently. In the future, ANYmal can be used anywhere that is too dangerous for humans or too difficult to pass for other robots.

Both humans and animals automatically combine the visual perception of our environment with the movement of our legs and hands. This allows us to handle slippery or soft ground and move around confidently, even when visibility is low. Until now, legged robots have been able to do this to a limited extent. With the programming of the robot, ANYmal has the ability to decide when to trust the visual perception of their environment and move forward, and when it is better to proceed cautiously and with small steps.

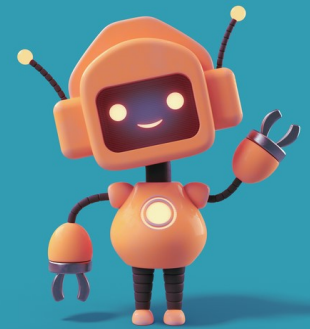
Thanks to a controller based on a neural network, ANYmal is now able to combine external and proprioceptive perception for the first time. Before the robot could put its capabilities to the test in the real world, the scientists tested the system to multiple obstacles and sources of error in a virtual training camp. This let the network learn the ideal way for the robot to overcome obstacles, as well as when it can rely on environmental data -- and when it would do better to ignore that data.

“With this training, the robot is able to master the most difficult terrain without having seen it before,” says Hutter. This works even if the sensor data on the immediate environment is unclear or vague. ANYmal then plays it safe and relies on its proprioception. According to Hutter, this allows the robot to combine the best of both worlds: the speed of external sensing and the safety of proprioceptive sensing.

Whether it be after an earthquake, during a forest fire, or another similar situation, robots like ANYmal can be used wherever it is too dangerous for humans and where other robots cannot move through the difficult terrain.

Resource:

<https://ethz.ch/en/news-and-events/eth-news/news/2022/01/how-robots-learn-to-hike.html>



What does “proprioception” mean?

Proprioception, otherwise known as kinesthesia, is your body's ability to sense movement, action, and location. It's present in every muscle movement you have. Proprioception allows you to walk without consciously thinking about where to place your foot next. It lets you touch your elbow with your eyes closed.

STEM Activity



Olympic Rings Experiment

To celebrate the closing of the 2022 Beijing Winter Olympics, create your own fizzy Olympic rings to honor the hard work and dedication of the athletes from around the world who competed this month. The Olympic rings have five rings that are interlaced from left to right with the colors blue, yellow, black, green and red. The design is symbolic to represent the union of the five competing continents and the meeting of athletes from around the world at the Olympic Games. Using just a few ingredients from your kitchen you will can create a chemical reaction in the shape of the Olympic rings.

Materials:

- Water
- Baking soda
- Vinegar
- Bowl
- Food coloring (blue, yellow, green, red)
- Squeeze bottles or a spoon and small bowls
- Tray or baking sheet

Directions:

1. Mix the baking soda and a small amount of water together. Add enough water and stir until the mixture has formed a dough like consistency.
2. Form the baking soda mixture into 5 circular shapes to resemble the Olympic Rings and place them on your tray or baking sheet. Set aside in your freezer or outside in the cold for about an hour.
3. Pour about $\frac{1}{4}$ cup of vinegar into each of your squeeze bottles or bowls and add food coloring to each one. (To make your food coloring black, mix together blue, green and red food coloring).
4. Take your vinegar that is in the squeeze bottles or bowls and pour it over the baking soda rings that you created earlier.
5. Observe what happens when the vinegar and baking soda react.



SAFETY FIRST!

You Must Have Adult Supervision To Complete This Activity.

The Science Explained:

When you mix the baking soda and vinegar together there are two reactions taking place. The first reaction that takes place is an acid-base reaction with the baking soda being the base and vinegar as the acid. The hydrogen atoms in the vinegar react with the sodium and bicarbonate ions in the baking soda, which results in the two new chemicals carbonic acid and sodium acetate.

The second reaction that takes place is a decomposition reaction. The carbonic acid that was formed immediately begins to decompose into water and carbon dioxide gas. Think of the carbon dioxide bubbles in a soda, the carbon dioxide that formed when the carbon acid decomposed rises to the top of the mixture. This is what creates the bubbles and foam you saw in the experiment when you added the vinegar to the baking soda.

Sodium Bicarbonate also known as baking soda is found in personal care items such as toothpaste because it helps remove surface stains from teeth.