March 2024

# GEORGIA PATHWAYS

MAGAZINE

## Embracing Tech In Class

Becoming a modern learning environment

## Tiny Life Forms Yield Big Insights

## April Solar Eclipse

TAG Technology Association of Georgia

TAG TAG-Ed Education Collaborative

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEAM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2000. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEAM education in Georgia.


President / CEO
Larry K. Williams

TAG-Ed Executive Director
Dr. Loretta Daniels

Publisher
Wayne Carley
wayne@tagonline.org

The Technology Association of Georgia (TAG)
and TAG Education Collaborative
4400 North Point Parkway
Suite 155
Alpharetta, Ga. 30022

http://www.tagedonline.org

# **The Future of Education:** How Teachers Can Use AI to Improve the Student's Experience

Artificial Intelligence (AI) is the most transformative technology of our lifetime. It could change the nature of work and redefine efficiencies in all industries. While there is still so much we need to learn about AI's impact, even its most basic implementation can help enhance a student's learning experience.

According to research, educators, whose time is already spread thin, can benefit significantly from AI and data-driven tools by automating repetitive tasks and creating new content personalized for their students. In a recent Princeton Review article, Exploring the Impact of AI on STEM Education, artificial intelligence is changing the way students learn in three significant ways:

1. Personalized learning: By analyzing student performance and behavior data, AI algorithms can identify areas where students need extra help and provide targeted support. This can help students learn more efficiently and effectively and help teachers identify areas where they need to focus their attention.
2. Adaptive assessments: Stud

ents can get individualized work that adjusts to their level, with questions that challenge them without being too easy or difficult. This can help students build confidence and motivation and provide teachers with more accurate data on student performance.

3. Virtual and augmented reality: Interactive experiences can help students better understand complex concepts. For ex ample, students can use virtual reality to explore the human body, visit historical sites, or visualize complex mathematical concepts.

AI is being incorporated into business operations every day, and business leaders should explore effective methods of preparing our future workforce for new AI technology uses. Likewise, we must prepare our educators to use AI tools to prepare students to be qualified to enter a technology-driven workforce. As education continues to adapt to the emergence of AI, its implementation promises to alleviate the administrative burden on educators and fundamentally enhance the quality and effectiveness of teaching.

As leaders in the tech ecosystem, the Technology Association of Georgia is dedicated to partnering with industry, community, and educational institutions to support the current and future workforce. We look forward to learning more about the innovative and creative ways educators leverage emerging technologies to design exceptional student experiences.

Larry K. Williams
President
TAG / TAG-Ed

Larry K. Williams serves as the President and CEO of the TAG and the TAG Education Collaborative. TAG-Ed's mission is to strengthen Georgia's future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.

WRIGHTNOW SOLUTIONS

# Nurturing Careers, Building Talent Pipelines

We equip individuals with the technological and business acumen skills necessary to navigate challenging and evolving industry dynamics.

## PREPARING TALENT FOR LONG-TERM SUCCESS

WrightNow Solutions is a people development firm committed to helping individuals achieve new heights of career success. Simultaneously, we create ready talent pipelines for corporations, from entry-level to executive positions, enabling companies to excel in the competitive talent landscape.

## We Train Participants to:

**PREPARE FOR THE JOB:**

- ☑ Strategic Career Networking
- ☑ Resume Writing and Interviewing
- ☑ Resume and Interview Coaching

**BE A GOOD FIT:**

- ☑ Workplace Etiquette and Norms
- ☑ Time Management
- ☑ Working in Teams
- ☑ Workplace Communication
- ☑ Company Stewardship
- ☑ Imposter Syndrome
- ☑ Navigating the Corporate Landscape

**EXCEL AT THE JOB:**

- ☑ Presentation Skills
- ☑ Conflict Resolution and Negotiation Skills
- ☑ Entrepreneurship/Intrapreneurship
- ☑ Business Innovation
- ☑ Bold Leadership

**ADVANCE:**

- ☑ Being an Effective Manager
- ☑ Managing Across Generations and Demographics
- ☑ The IT Factor: Showing up with Confidence, Presence, and Credibility

## Technical Training We Provide:

- ◇ Project Management
- ◇ Cloud Computing
- ◇ Artificial Intelligence
- ◇ Data Science & Analytics
- ◇ Networking
- ◇ Automation
- ◇ Cybersecurity
- ◇ CRM
- ◇ Web Development

## Having a culture of Belonging is critical for every organization. Our facilitated sessions include:

**Self-Understanding:**

- ✓ From Unconscious Bias to Conscious Inclusion
- ✓ Effects of Microaggression
- ✓ Being "The Only"

**Cultural Intelligence:**

- ✓ Importance of Intercultural Communication
- ✓ How Inclusive Leaders Create Cultures of Belonging

## Ready to elevate your career or empower your workforce?

Contact WrightNow Solutions today to discover how our tailored training programs and people development strategies can make a lasting impact.

✉ Info@wrightnowsolutions.com

🌐 www.wrightnowsolutions.com


TAG | TAG-Ed Education Collaborative

## Article Requirements

- Word.doc / 1,500+ Word Count
- Completely proofed
- Title, Author, Short bio
- Images as attachments / .jpeg, .pdf, .png
- Image resolution: 300 dpi
- Deadline: 1st of each month
- Send to Wayne@tagonline.org

## Advertising Requirements

- Full page advertisements only
- Vertical 8.5 x 11 (1/8" bleed)
- Full color
- Resolution: 300 DPI
- File type: JPEG, PDF, PNG, hyperlink capability available
- Embedded video available (YouTube code)

# STANDARD ADVERTISING

**Full Page Advertisements Only**

Front Cover: $950

Inside Front cover: $550

Back Cover: $375

Resource Page: $50 / Issue

# ARTICLE SUBMISSION PACKAGES

### TWO PAGE FEATURE ARTICLE CENTER SPREAD

$2500

- Full page ad included
- Hyperlink and embedded video capability
- Article title on cover
- Inclusion of programs, events, state initiatives, and efforts of note

### TWO PAGE SPREAD ARTICLE

$2000

- Interior location
- Hyperlink capability

### ONE PAGE ARTICLE

$1000

- Interior location
- Hyperlink capability

# Embracing Technology in the Classroom

By Wayne Carley

Let's begin by defining 2 distinctly different levels of technology, and consider their contribution or hazardous potential to the modern classroom.

We will label the first as "established and tested" technology, and the second being, "emerging AI and untested" technology.

The modern educator no doubt incorporates many established forms of tech that may include internet access, smart board, tablets, cell phone use, digital libraries and remote homework capabilities.

There remains a large population of schools in the U.S. who are without the simplest forms of tech access, though these numbers are improving. Seventy-four percent of school districts (9,573) across the country now have school internet connectivity at speeds that are sufficient to support digital learning in their classrooms, impacting over 27 million students, an increase of over 5 million students since 2022.

Still, we see a disturbing 25 percent lacking basic tech that we've come to expect in schools and the potential weakness in the quality of education and lack of preparedness for students looking forward to higher education and beyond.

For this 74 percent, they may be enjoying Wi-Fi in the classroom and the conveniences of exceptional tools for teaching that give them a boost in the quality and innovation students and future employers have come to expect. The levels of student enthusiasm and engagement will certainly be on the rise as the innovation in tech makes its way into the classroom and hopefully the home where both students and parents benefit from these advancements.

These technologies provide instant accessibility to information, which is why its presence in the classroom is so vital. Smart-phones, computers, and tablets are already a well established element of everyday life for students and teachers alike. It's only natural that the use of these technological devices in the classroom continues to be explored to create meaningful and relevant learning experiences for students in all grade levels.

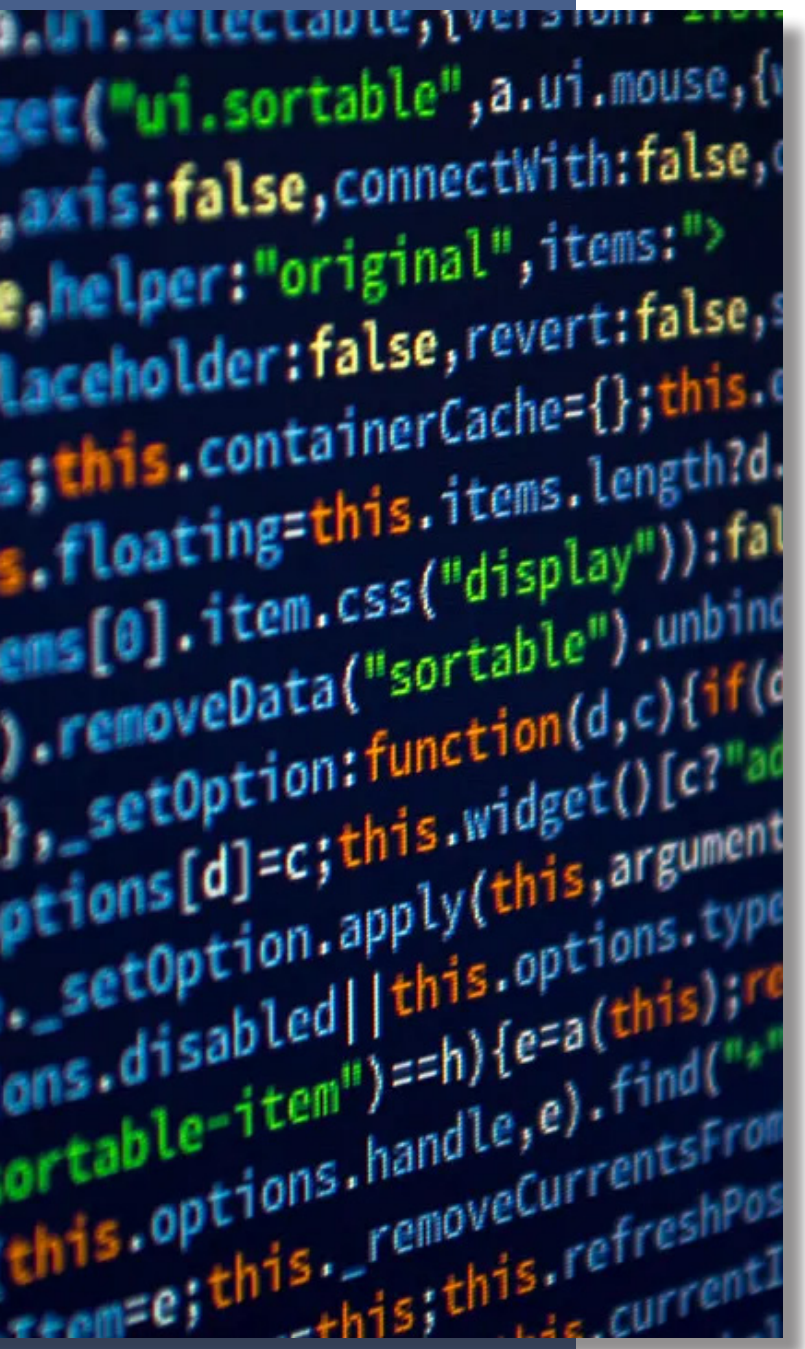
These basic access tools are considered well tested, effective, safe, and valuable for an improved learning experience with adult supervision.

An important and necessary trend in K-12 educational institutions is the continuing upgrades to school firewalls, preventing intrusion by those who would exploit, misinform or endanger students as they browse the web. Both undesirable and "valuable" sites are usually blocked on the front end by the districts information tech professionals.

It's common for schools to have a "white list" of approved websites cleared for viewing within the schools system and it falls upon educational resource organizations to get clearance from individual schools to be placed on their white list. This is a necessary and voluble precaution to safeguard our students and discourage "unfocused" classmates who would use their internet access for less than beneficial purposes.

The second category of "un-tested" tech to explore are the newest innovations in "software", such as ChatGPT, AI inclusive programs, and virtual classroom experiences that often include 3D goggles for a truly immersive learning experience. Other common tools that are technically considered AI include Alexa, Siri and information apps along with a host of software applications.

It's important to remind everyone that AI is simply a human created series




of coding algorithms that gather, organize, store and "steer" information.

"Consider the source" should be a warning label on every internet search and app interaction, as AI has not been shown to be trustworthy, accurate or harmless, much like some individuals who are writing these algorithms for their unique purposes. The basic computer has not changed much other than becoming a bit faster in its ability to access information, but that certainly depends on internet speeds, computer chip levels and firewall protections.

Some challenges with newer software applications include the non-educational intent of some making app's available on a Smartphone, thus bypassing some school firewall safeguards. Not every company has the best interest of our students at heart, and our responsibility to intervene when necessary and possible remains.

Apps such as ChatGPT remain controversial in schools with the temptation to stop "thinking for yourself" and have an app do your homework for you. I can't imagine any educator supporting this behavior, but there are a variety of "counter apps" to identify the use of ChatGPT and interrupt this choice. That being said, if an educator were to constructively include the use of ChatGPT within their supervised

curriculum "in class" for a specific purpose, value could be found. The bottom line is that educators need to know about, understands and be able to interact with these apps and software applications for prevention and appropriate inclusion. The students are using them and their teachers need to know as much as possible about these tools to better formulate their use or prohibition.

This digital evolution can equip teachers and students with essential skills, preparing them for a future where technology plays an even more integral role in every aspect of society, but the adults still need to be charge.

## How to Integrate Technology in the Classroom

There is a common misconception that the integration of technology in the classroom can be a financial burden for school districts, but students do not necessarily need their own tablets or laptops to succeed with technology interaction. The use of technology during entire-class instruction can foster student engagement for auditory and visual learners. Integrating simple technologies such as free online educational games, Power Point presentations, and online internet homework assignments can make a noticeable difference in a students' growth in the classroom and the effectiveness of their teacher.

# "Consider the source"

Utilizing different types of technology in the classroom, including a virtual classroom, can create learners who are actively engaged with learning objectives. The inclusion of technology also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate. No everyone learns the same way and a variety of "paths" to understanding should be considered and available. Tech can provide this.

Technology does and will transform all levels of education by potentially enhancing engagement, personalizing learning, and fostering collaboration. Edtech tools like immersive experiences, educational apps, and online platforms empower educators to create dynamic, interactive lessons when skillfully applied by the teacher.

A simple PowerPoint presentation can be used to introduce a classroom concept while providing the opportunity for engagement, creativity in design and the evaluation of content. Along with the use of graphics and bulleted information, links to videos that accom-

pany the ideas presented in the PowerPoint can be embedded within the slides and remain in the teachers control.

Educational apps in the classroom can be used to review information after a lesson or unit. As these applications are constantly changing, an occasional Google search by educators is recommended of educational games, tools and interactive lessons to include as you wish. Many of these apps have a cost associated with them, but there are a variety of free ones to consider. The use of these allows whole-class participation from students who may usually be reluctant to participate in class and encourage them to branch out and collaborate with their classmates.

## Cell phones in class

It's been this author's personal experience over decades in the classroom that Smartphone inclusion is not worth the effort as it continues to be a constant distraction and temptation to all. The drawbacks beyond grade 5 inclusion far outweigh any benefits and the negative impact on the student's ability to remain focused on the lesson is greatly diminished.

The obvious distraction for the student has little to no educational value compared to other more beneficial options. The argument about access to Smartphone apps as a student tool in class rings hollow in actuality. There are better choices available.

## Homework

Posting homework assignments online via learning platforms as well as internal school created platforms are ways many teachers can begin to integrate technology in the classroom if they are not already using this. Assignments are easily accessible on a teachers school portal, which can increase student engagement and help students become more organized and less forgetful about what is expected of them in the short term.

Communication remains key in education that helps teachers, administrators, parents, and students recognize a student's strengths and areas for improvement. Online grading systems can open and facilitate lines of communication where teachers can post grades, analyze student attendance patterns, and manage transcript data. Once again, this software often has a cost associated with it and options such as a teacher portal, located on the school website and teacher page are cost free and very effective.

The value of staying in touch with the parents cannot be understated. Parent inclusion of the tech being integrated

in the classroom and used by students is an important component for everyone's scholastic success and effective communication. If teachers are limited in their ability to communicate with parents at will, it's strongly suggested that this avenue of interaction be explored as a priority.

## Classroom Tablets

The affordability and access to tablets or iPads has improved tremendously as it is often the "Go to" contribution of companies and supportive organizations to the educational cause, especially in underserved communities. The industry of "refurbished" iPads allows for even greater distribution of this hardware resource. For classrooms that are fortunate enough to have tablets for students, technology can allow teachers to implement differentiation throughout instruction. Students can work at their own pace during assignments and teachers have the opportunity for one-on-one instruction. The benefits of technology will enhance any contemporary classroom, and the way technology is implemented and used with various grade levels will differ.

## The Elementary Classroom

For younger students, technology can be used to build fundamental skills to prepare them for future independent learning. Students can use interactive games to reinforce math, spelling, phonetic, and reading skills. Sites like Arkadium (https://www.arkadium.com/free-online-games as well as spelling and Spell Training https://www.spellingtraining.com allow students, teachers and parents to upload their own word lists to practice word pronun-

ciation and create interactive games. This is a fun exercise and parents need to know about and interact with their children to support and encourage fundamental skills at home. This is free tech for use at home where the integration of technology may be lacking as well. Any visual, interactive tech application will always be a hit with elementary students and perhaps an expectation in the modern classroom.

## The Middle School Classroom

As students mature socially and personally, they begin transforming into independent thinkers, and are using technology to develop life skills. Using technology to acquire skills such as conducting research can be applied to any content area. In this decade, search engine use is nothing new to the middle school student, but free access to the web can be a dangerous road. Many experts recommend that parents insist on access to their young teen's computer to review their "history" and "searches" for everyone's protection. With teen suicide, bullying, social media hazards and explicit content at epidemic levels and just a click away, we have to question who is responsible for our kids and their tech?

Every device, software application and electronic interactions has the potential of being valuable or doing harm, inside and outside of the classroom. Someone must take charge and be responsible for teen tech use and the consequences.

## Tech in High School Classrooms

By the time students enter high school, they have had exposure to a wide variety of technologies, old and new. It's not unusual for teachers to fall behind on current tech applications and be a bit slower to integrate them into the classroom. New hardware in class is often cost prohibitive, but software can be inexpensive or free. The need for High School students to be aware of and able to interact with cutting edge software tech is critical for their integration into the current and future workforce.

This inclusion has extreme value in class during the High School years to provide the practical applications necessary to excel scholastically in school and preparation for college, or other alternate type of further education.

One noticeable distinction educators are observing in class is the unique division of students as they interact with tech with very different motivations. One group leans toward simple tech for social media interaction and entertainment, while the other group shows a deeper attraction to tech for the advancement of their scholastic, collegiate and career development goals. This quickly becomes evident in the High School classroom as students embrace and interact with new apps and innovative software applications.

This is where the modern educator much keep pace with their bright and motivated students to provide the tech atmosphere they require to excel today and into the future workforce.

The necessity of the educator to have a working knowledge of new tech, both hardware and software, allows for mature oversight in its use and adult leadership in its incorporation into the class curriculum. Understanding, including and using similar software platforms by educators sets an example as an instructor, to support and collaborate with highly motivated students using these new tools, while hopefully inspiring the less engaged to consider a more aggressive and innovative path forward.

The need for all students and educators to be competent in Microsoft Office products, search engine use, Excel, presentation software, online research tools and protective software to prevent Malware, computer viruses and scams, is vital to the success of both. Most career paths will require these tools at minimum while technology continues to grow at a rapid pace.

Technology has become its own form of literacy and educators must remain the most tech literate individuals in the classroom, for a modern and effective learning environment.

# "CITIES OF THE FUTURE"

## Award-Winning Actor John Krasinski Narrates MacGillivray Freeman's 3D Documentary for IMAX® and Giant Screen Theaters

MacGillivray Freeman Films, the world's foremost independent producer and distributor of original giant-screen 70mm films, today announced that award-winning actor John Krasinski will narrate "CITIES OF THE FUTURE," the company's latest 3D large-format documentary for IMAX® and giant screen theaters, produced in association with the American Society of Civil Engineers (ASCE). Opening in select museum and science center theaters starting February 16, "CITIES OF THE FUTURE" invites audiences to explore the innovations engineers are designing now to meet the pressing challenges of a changing world and forge a brighter, more sustainable future.

From electric flying cars and aerial highways to smart buildings, greener infrastructure and solar power beamed down from space, this documentary offers an inspiring vision of how we will live 50 years from now, combining state-of-the-art CGI with live-action cinematography. The film also looks at modern urban landscapes in the midst of transformation, revealing profound changes already happening in some of the world's greatest cities, from Los Angeles to Amsterdam to Singapore.

"*John Krasinski is an exciting and talented storyteller, and his voice will lend a warmth and humanity to our story about human ingenuity and the solutions scientists and engineers are working on now to help our cities adapt to challenges like climate change and population growth,*" says director Greg MacGillivray, two-time Academy Award® nominee and chairman of MacGillivray Freeman Films.

"'CITIES OF THE FUTURE' imagines what our lives might look like 50 years from now based on the engineering marvels being designed by visionaries today."

"*Audiences will be fascinated to discover how engineers see the future and all the incredible new technologies they are designing to help our cities adapt,*" said John Krasinski. "*I'm thrilled to be working with the creative team at MacGillivray Freeman Films to help bring this exciting vision of the future to life with the power of the giant screen experience.*"

This feature also introduces viewers to a team of middle school students participating in the Future City® Competition, an annual contest where 60,000 middle school students compete to create a model future city.

Shaun MacGillivray, the film's producer and co-director, and president of MacGillivray Freeman Films, states, "Parents and teachers are looking for ways to turn kids on to science and engineering. We hope 1 of 2 "CITIES OF THE FUTURE" will inspire kids to see engineering as a meaningful way to help others and leave a positive mark on the world."

John Krasinski is one of the most exciting talents as an actor, writer, and director, engaging audiences on the big and small screen. He is in post-production on "IF" for Paramount, which he wrote, directed, produced, and starred in. Krasinski co-wrote, directed, and starred in the 2019 Academy Award-nominated "A QUIET PLACE," which was also nominated for a PGA Award, WGA Award for Krasinski for Screenplay, and won star Emily Blunt the SAG Award for Best Supporting Actress, and was named one of AFI's Top 10 Films of the Year.

"CITIES OF THE FUTURE" is produced by MacGillivray Freeman Films in partnership with ASCE, the same award-winning team that created the blockbuster giant-screen documentary "Dream Big: Engineering Our World."
www.citiesofthefuturefilm.com

About the American Society of Civil Engineers:

Founded in 1852, the American Society of Civil Engineers represents more than 150,000 civil engineers worldwide and is America's oldest national engineering society. ASCE works to advance engineering knowledge and competency through the development of codes and standards, publications, education, and programs such as Future World Vision; raise awareness of the need to maintain and modernize infrastructure using sustainable and resilient practices through initiatives such as the Report Card for America's Infrastructure; and works to recruit and inspire a more diverse engineering workforce.


Flying Cars
Smart Buildings
Solar Power
Beamed From Space
MacGillivray Freeman's
CITIES
OF THE
FUTURE
Discover the human innovations transforming our world
Narrated by
John Krasinski

OAK RIDGE National Laboratory

# Louise Stevenson:
## Tiny life forms yield big insights into ecosystem health

By Gabriela Vara / ORNL

Stepping into the Aquatic Ecology Laboratory at the Department of Energy's Oak Ridge National Laboratory, you can hear the sound of bubbling water. It's the background music for Louise Stevenson as she moves about her day, exploring what aquatic species like fish, algae or tiny crustaceans can tell us about how contaminants may be affecting the nation's water.

Stevenson is the principal investigator for the Environmental Toxicology Laboratory, which sits within the Aquatic Ecology Lab facility. In the Biodiversity and Ecosystem Health group at ORNL she uses her expertise as an environmental toxicologist to evaluate the effects of stressors such as chemicals and other contaminants on aquatic systems.

Projects in the "tox" lab, as Stevenson calls it, aim to characterize the impact of human-made stressors on natural systems.

For aquatic systems, this includes water discharged from industrial, municipal and agricultural sources that flow directly into surface water.

To understand the effects of contaminants on an aquatic ecosystem, Stevenson uses regulatory testing and model organisms, which are well-studied organisms that allow her to make inferences at the population level. She works most often with Daphnia magna, small planktonic crustaceans related to lobsters and crabs. Also known as "water fleas," Daphnia are found in ponds and other bodies of water.

Daphnia are an essential component of Stevenson's environmental research because they have short life cycles and are sensitive to the presence of toxins in the water, exhibiting measurable changes in their activities that act as a gauge for how other aquatic organisms might be affected.

Louise Stevenson uses her expertise as an environmental toxicologist to evaluate the effects of stressors such as chemicals and other contaminants on aquatic systems. Credit: Carlos Jones/ORNL, U.S. Dept of Energy

"I consider Daphnia kind of the 'canary in the coal mine' of aquatic toxicity," Stevenson said. "They are filter feeders, so they interact with a large volume of water and are also very sensitive organisms. They are widely studied, so we know a lot about how Daphnia respond to various abiotic and biotic stressors, which we can leverage into models of individuals and populations of Daphnia to predict impacts beyond the limits of our experimental design."

## Improving Toxicity Techniques

Stevenson is working to develop a framework that models and predicts how environmental stressors trigger changes across scales from individuals to populations and ecosystems. Her primary focus is on connecting changes in gene expression to an individual's stress response, such as a fish making more of a particular enzyme in response

Daphnia act as the aquatic equivalent of a canary in a coal mine, signaling the presence of toxins in water through changes in their behavior. Credit: Carlos Jones/ORNL, U.S. Dept of Energy

to a toxin in the water. She is interested in applying findings about individual toxicity responses to the management of entire populations and ecosystems.

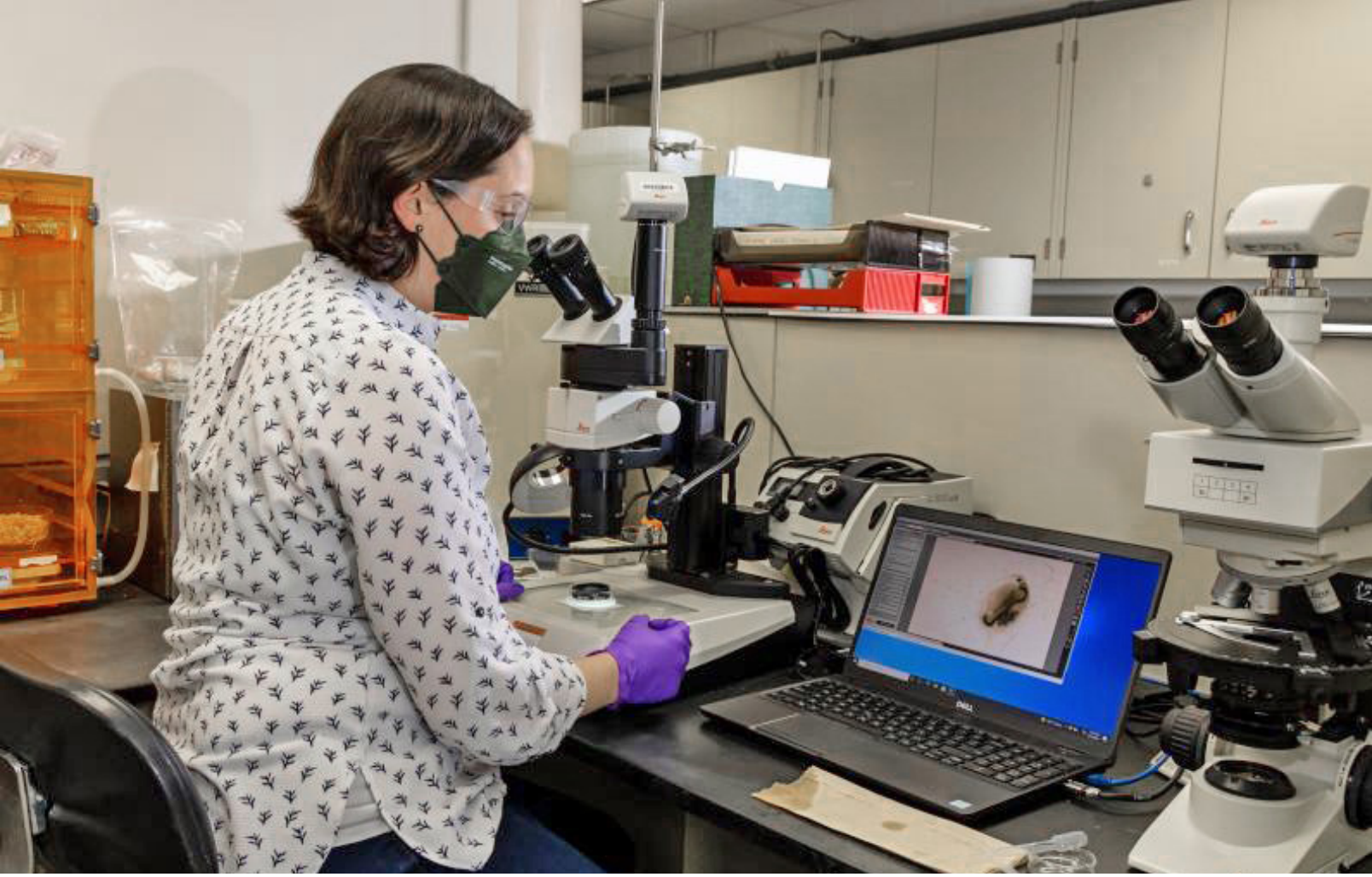
"We're trying to mitigate ecological risks on these systems as a whole," Stevenson said. "Extrapolating effects from individuals up to populations and communities can help scientists understand ecological risks at higher biological levels, where processes and interactions become more complex."

Current best practices for environmental monitoring use standardized testing that minimizes variability on purpose. Stevenson is working on advancing environmental monitoring techniques to make them more efficient, effective and ecologically relevant. "While it's important to do, these tests are so standardized that you're going to get the same results with the same conditions every time in any lab," Stevenson said. "Monitoring the environment is crucial in understanding the anthropogenic effect that chemicals and other existing and emerging contaminants have on the natural environment."

Stevenson's collaboration with scientists in other divisions at ORNL is an essential component of her work and demonstrates a core value at the laboratory: teamwork. "We're working with material scientists who are developing novel lubricants for turbines deployed in aquatic systems," she said. "As new lubricants are developed, we test the toxicity compared to those commercially available; this way the formulation can be refined."

Stevenson is also studying the toxicity of per- and polyfluoroalkyl substances, or PFAS, synthetic chemicals widely used in consumer products to confer resistance to water, grease and oil. These long-lasting chemicals, frequently called forever chemicals, can be found in soil, air and water. Studies have shown they are linked to harmful health effects because of their persistence in the environment.

With funding from the Department



Stevenson uses small invertebrates, such as this Daphnia magna, to determine whether water contains toxic chemicals. Credit: Carlos Jones/ORNL, U.S. Dept of Energy

of Defense's Strategic Environmental Research and Development Program, researchers at ORNL are investigating the toxicity of PFAS in aqueous fire-fighting foam.

## Family beach trips nurture an interest in the aquatic environment

Stevenson first became interested in science on family trips to the ocean. She grew up in landlocked Dallas, Texas, but those beachside vacations and her natural curiosity inspired her to consider a career in marine biology. She pivoted to environmental toxicology in college after working on a project examining Siamese fighting fish and how they are affected by plant-based hormones like those discharged from some papermill operations. Under the influence of those phytoestrogens, the fish experienced behavioral and neural changes.

"What I found," Stevenson said, "is that the problem of just one little fish in one little beaker in one little lab at one little college actually has applications to the whole natural world." She discovered something more as she pursued a

career in science. "As I got more experienced and got my feet wet literally and figuratively, I realized that I actually liked being in a lab with the ability to control as many variables as possible to better understand these systems," Stevenson said. Her work has largely pivoted toward improving lab-based testing and analysis as a result.

Stevenson received a bachelor's degree in biology from Amherst College in Massachusetts and holds a doctorate in ecology from the University of California, Santa Barbara. Before joining ORNL in 2020, she was an assistant professor of environmental toxicology in the Department of Biological Sciences at Bowling Green State University.

She praises the research environment in ORNL's Environmental Science Division, describing an atmosphere in which a diverse group of scientists bring their unique backgrounds, expertise and skills to study the anthropogenic effects of energy use on the environment. Using both traditional monitoring methods such as community sampling and novel research methods allows the group to maintain and continue collecting data on species and ecosystems.

"We're maintaining active research programs in keeping a multidecade dataset going with really rich, frankly beautiful data," Stevenson said. "But we're also developing novel methods to push the science forward. We want to develop new ways of conducting this monitoring that will be potentially more efficient, more effective and cheaper."

Outside of the tox lab, Stevenson enjoys reading and spending time with her family.

Stevenson is also a strong advocate for women's representation in science. She is the immediate past chair for Women in Science and Engineering, or WiSE, an ORNL employee resource group that is part of the laboratory-wide Woman's Alliance Council. Through her involvement in WiSE, she has made numerous connections with others and works toward building a supportive environment to increase the retention of women at the lab.

UT-Battelle manages ORNL for the Department of Energy's Office of Science, the single largest supporter of basic research in the physical sciences in the United States. The Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit energy.gov/science. — Gabriela Vara

**Share this issue with your students, peers, parents and industry professionals you know. Make this a new monthly connection for curiosity, interaction, college prep and career development.**

**Many parents really enjoy this content as they too pursue their personal life-long learning goals.**

***International industry and government leaders need to know about this resource as their future employees decide and prepare how to spend their careers.***

# 08 April 2024

## North American Total Solar Eclipse

By Dr. Michaelyn Thomas / Space systems engineer

For millennia, humanity has been mesmerized by the wonders of total solar eclipses. It is something that is not experienced regularly, and based on the position of the Sun, planet Earth, and Earth's Moon, it can be a very rare spectacle to experience based on the region you live in.

On Monday, 08 April 2024, a total solar eclipse will travel across specific regions of Mexico, United States, and Canada known as the total path of totality in North America. A total solar eclipse is when Earth's Moon passes between the Sun and planet Earth, and completely blocks the surface of the Sun. When this happens, the sky will darken, and viewers located on the North American path of totality will be able to see the Sun's outermost atmosphere, also known as the Sun's corona. The corona is usually hidden by the brightness of our star, the Sun.

## Types of solar eclipses

While North America will be experiencing a total solar eclipse this 08 April 2024, there are other types of solar eclipses that occur at various points of time. Generally, a solar eclipse occurs when the Sun, Earth's Moon, and planet Earth are in alignment fully or partially. Based on full or partial alignments of solar eclipses, the view from planet Earth is out-of-this-world. When Earth's Moon passes between the Sun and Earth, it will cast a shadow on planet Earth, temporarily blocking the Sun's bright light.

Total solar eclipse. Being on the path of totality is key when viewing a total solar eclipse. The path of totality is the track of Earth's Moon's shadow across the surface of planet Earth. If you want to see the Sun completely eclipsed, it is critical that you are located within the approximately 16,000 kilometers long and approximately 160 kilometers wide path of totality. If unable to get to the path of totality for viewing, it is still possible to see the total solar eclipse partially eclipsed.

Annular solar eclipse. While Earth's Moon still passes between the Sun and Earth, an annular solar eclipse occurs at the furthest point from planet Earth. During annual solar eclipses, Earth's Moon is farther away from planet

Earth, therefore it appears significantly smaller than the Sun and does not completely block the Sun. Visually, the Sun appears to have a dark spot on its surface.

Partial solar eclipse. This happens when the Sun, Earth's Moon, and planet Earth are not in perfect alignment, causing the Sun to be partially eclipsed. Earth's Moon is still passing between the Sun and planet Earth, and visually, the Sun will appear to have a crescent shape because only a part of the Sun will be covered.

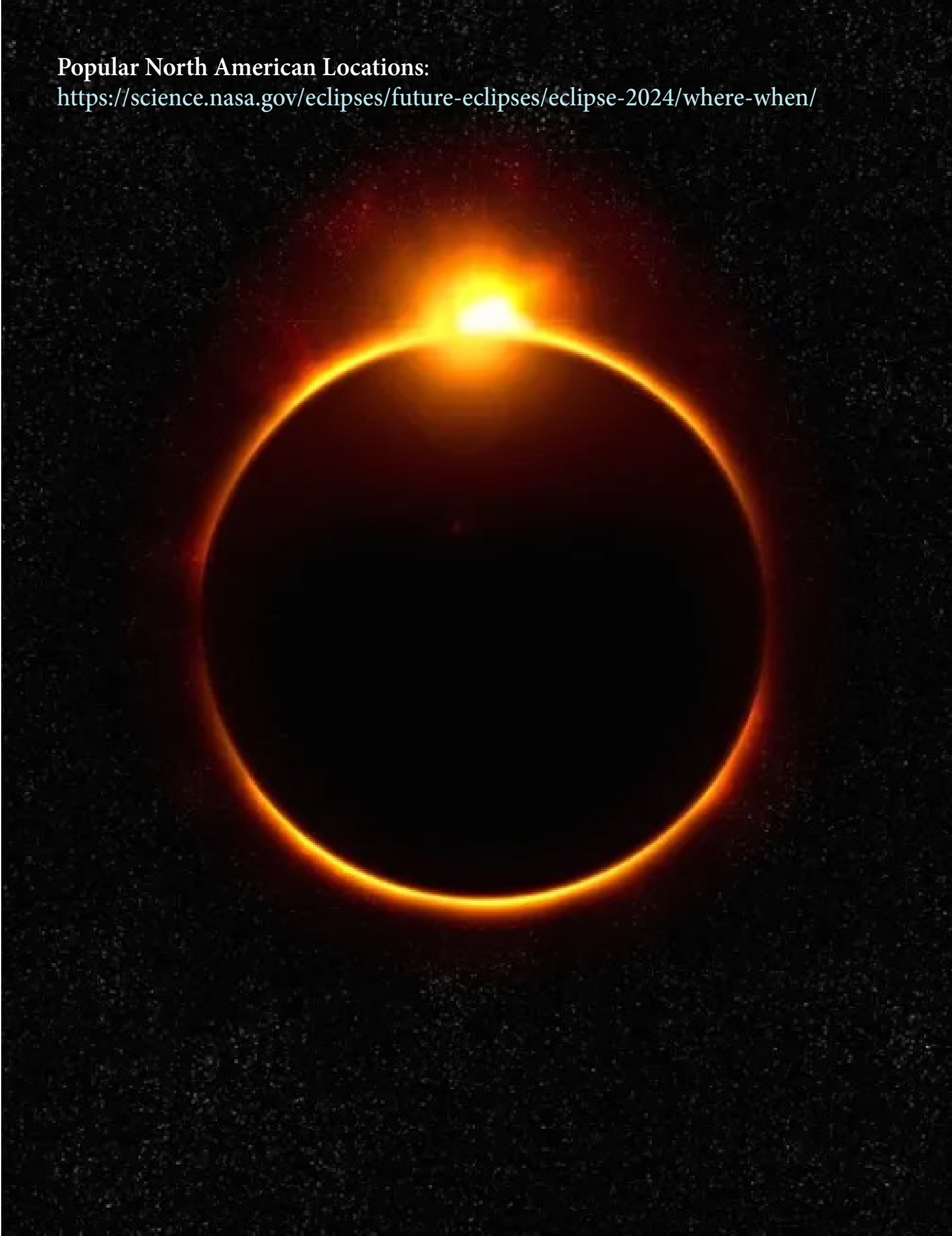
Hybrid solar eclipse. This is very interesting, because as Earth's Moon's shadow travels across planet Earth, a shift between an annular solar eclipse and a total solar eclipse may occur. This is primarily due to the curvature of planet Earth.

The North American path of totality: Popular locations for viewing

On Monday 08 April 2024, the path of totality will be visible in several North American locations. The total solar eclipse will start over the South Pacific Ocean, and Mexico will be the first country located within North America to be on the path of totality. The total solar eclipse will continue through parts of the United States of America and Canada.

The following table highlights popular places located within the total path of totality across North America. All times are in Mountain Daylight Time (MDT), Central Daylight Time (CDT), Eastern Daylight Time (EDT), and Atlantic Daylight Time (ADT).

**Popular North American Locations:**
https://science.nasa.gov/eclipses/future-eclipses/eclipse-2024/where-when/



## Animals and wildlife

Amongst the many human total solar eclipse onlookers, many pets, wildlife, and insects will also be experiencing the total solar eclipse across the path of totality. Unlike most humans, animals will have less of an understanding as to what is occurring in their environment.

Many members of the animal kingdom will be confused and slightly disoriented. Some wildlife will mistake the sudden darkness caused by the total solar eclipse for evening time. With this incorrect understanding, many wildlife animals will commence their twilight routines which includes feeding, producing sounds, and other nighttime behaviors. Once the Sun suddenly reemerges after the total eclipse has ended, they will most likely believe it is morning time, and they may be confused by the short lapse in what they perceived as nighttime.

Pets will most likely not be as affected as wildlife. However, many house pets are on schedules and may be slightly confused, too. Their reactions could be similar to a sudden change in weather. Farm animals, such as livestock, may return to the barn or nighttime quarters, and certain insects may flush into the air as a rapid reaction to abrupt darkness.

Animal behavior will be different across the animal kingdom, and it will be interesting to observe them, while also safely viewing the total solar eclipse.

## Safety first

It is very important to prioritize safety when viewing any solar eclipse. If you fail to safeguard your eyes, this can cause a severe eye injury and possible blindness.

It is never safe to look directly at the Sun unless you have specialized, protective solar eclipse glasses or viewers for onlooking. Regular sunglasses, no matter how dark they are, will not properly protect your eyes. Your solar eclipse glasses or viewers should comply with the International Organization for Standardization (ISO) 12312-2 safety standard. It is very important to note that when looking to purchase solar eclipse glasses or viewers, the National Aeronautics and Space Administration (NASA) does not approve any specific brand of solar eclipse glasses or viewers—beware of counterfeit manufacturers.

Once you receive your solar eclipse glasses or viewers, be sure to inspect them with scrutiny. If there are any defects, toss them and do not attempt to fix them or wear them. When viewing the total solar eclipse with friends or loved ones, it is important to supervise and help children and others who may need assistance with their solar eclipse glasses or viewers.

Further, while wearing the proper solar eclipse glasses or using solar eclipse viewers, do not look through binoculars, telescopes, camera lenses, or any optical gadgets while looking directly at the Sun. The concentrated solar rays via the optical device will burn through the filter of the solar eclipse glasses or viewers and may cause a serious eye injury.

Lastly, do not forget to wear sunscreen and skin protective gear when out in the sun for prolonged periods of time. During the eclipse phases, the Sun will still be shining, so it is very important to protect your skin and eyes appropriately.

## Space exploration and scientific discovery

Appreciating the wonders of space from planet Earth will continue to promote science education across the globe. Safely viewing solar eclipses is a very simple way to spark scientific wonder across all ages and generations. Inspiration and motivation can be found across the cosmos, and the more we can rally as a community behind scientific discovery, the more informed humanity will become.

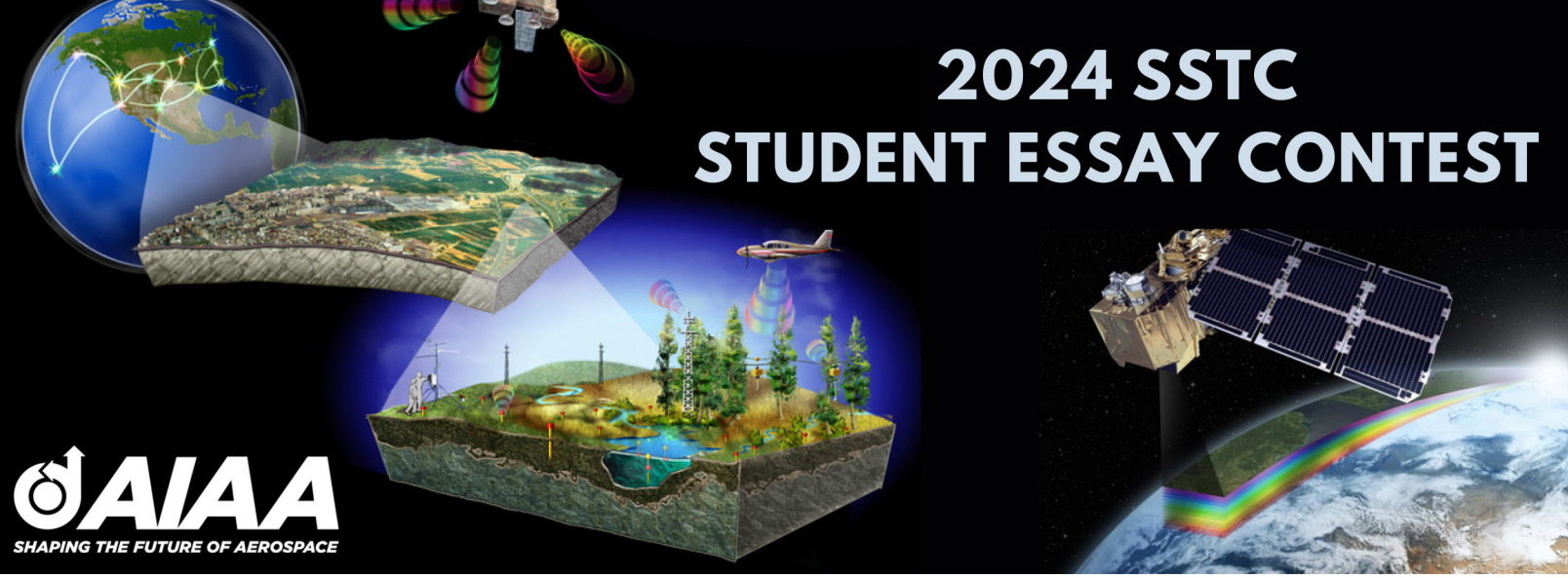
Learning how our universe works is pivotal to how humanity will survive and make sustainable decisions on planet Earth. Humanity continues to look up because insatiable curiosity is at our core—the sky is no longer the limit, but rather, it is the start of a scientific journey throughout our solar system and beyond.

About the author:

Dr. Michaelyn Thomas is a senior executive leader with nearly two decades of start-up and traditional space industry experience in the private and public aerospace sectors. She has an extensive success record in technical program management, business operational strategy, and model-based systems engineering of complex space systems.

Scholastically, Dr. Thomas belongs to Tau Beta Pi, the engineering honor society. She holds a doctorate degree in organizational leadership from University of La Verne; a master of science degree in space systems engineering from The Johns Hopkins University; a master of business administration (MBA) degree from University of Redlands; and a bachelor of arts degree in political science, public law with a minor degree in Russian language from California State University, Long Beach.

Dr. Thomas is the founder of https://spacedoutdoc.com/, and there she shares thoughts, experiences, and research through storytelling in efforts to build community with a shared vision of women empowerment in the aerospace industry. She is also very passionate about community service, and she dedicates her spare time to inspire as many underrepresented groups to pursue STEM education and STEM careers. She accomplishes this through community STEM activities, sponsorship, and serving as an executive mentor for the Patti Grace Smith Fellowship program which provides Black college students with paid internships in the aerospace industry as well as leading as a board member for the Society for the Advancement of Material and Process Engineering (SAMPE) foundation which aims to expand and enhance K-12 STEM education and knowledge of advanced materials and process engineering by bringing this curriculum to classrooms around the Nation. Further, Dr. Thomas serves as an advisory board member for Tau Beta Pi to ensure the enhancement of engineering resources are shared and are consistent across all collegiate chapters around the globe.




## THE AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA) & THE AIAA SPACE SYSTEMS TECHNICAL COMMITTEE (SSTC)

THEME: "Explore the profound effects of space observation on a particular industry of your choice. Investigate how advancements in satellite technology have revolutionized this industry's practices, strategies, and overall impact. Consider the differences in data resolution (spatial, temporal, spectral) obtained on the ground, from an airplane or space. Discuss how space observation has either complemented or replaced the other observation methods of the chosen industry."

REQUIREMENTS:
- Typewritten essay, double-spaced, Times New Roman, 12 pt. font, in 1,000 words or less
- Include student name, teacher name, grade, and school name printed at the top of the essay
- Submit essay to your local section, with student and teacher's: name, phone, e-mail, and mailing address for notification and awards in the body of the email

DEADLINE: Essay submission deadline to local AIAA section officers is April 30, 2024. Submission of local section winning essays to the national contest is May 13, 2024. National winners and their teachers will be notified in June 2024.

JUDGING CRITERIA:
1. Originality of ideas presented (30%)
2. Soundness of logic used to develop ideas (30%)
3. Realism of ideas presented (20%)
4. Quality of composition & clarity of expression (20%)

NATIONAL PRIZES:
1st place will be awarded $125,
2nd place will be awarded $75, and
3rd place will be awarded $50.
Winners are publicly announced in the September 2024 issue of Aerospace America magazine.

ELIGIBILITY: Any seventh or eighth grader (or equivalent). Please contact your local section officers (https://www.aiaa.org/get-involved/regions-sections) to confirm they will be accepting entries. For local sections not participating, you may submit to "at-large" through Jeff Puschell, jjpuschell@gmail.com.

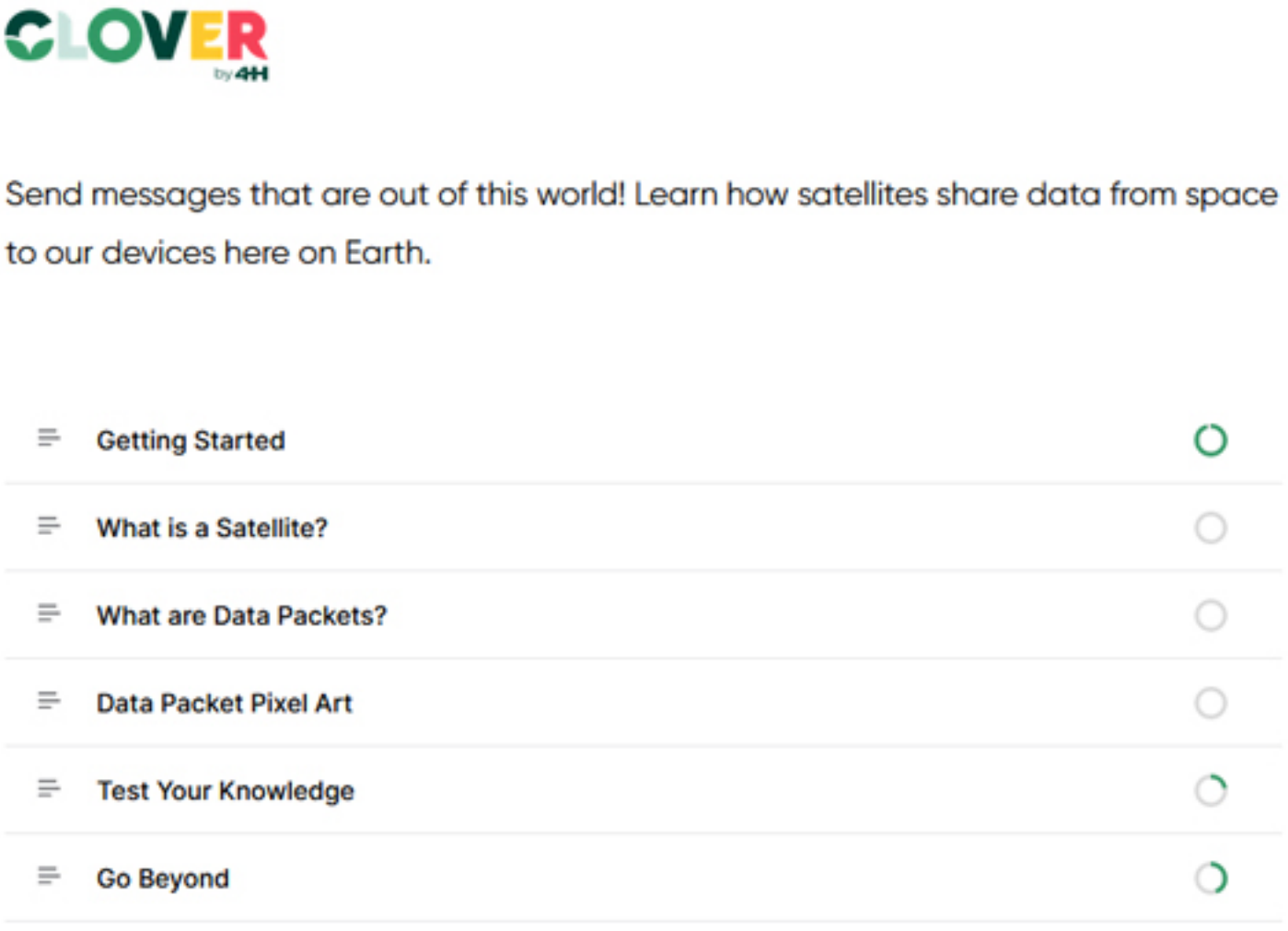
QUESTIONS: Email Smrithi, Shane and Anthony Shao-Berkery (smrithik@umich.edu , sjvigil@gmail.com, ant.shao@gmail.com)

# Free Educator Resource

This past July, Hughes Network System launched their highest capacity satellite ever, JUPITER™ 3. The new JUPITER™ 3 satellite lets Hughes supply reliable and faster Hughesnet internet services connecting friends and families with loved ones around the world.

4-H and Hughesnet have teamed up to offer children an opportunity to explore the scientific principles behind the transfer of data via satellites through an engaging hands-on activity. The Data Packets activity provides a distinctive interactive learning experience, educating kids about how satellites use data packets to transmit information and the decomposition process involved in this fascinating process.

START COURSE



# "How my academic training helped me become a better Scientist in industry."

by **Minal Mehta**
Research Scientist, AstraZeneca, Gaithersburg, Maryland

I was ecstatic when I first found out that I got an industry job offer in a major pharmaceutical company, a few months before I was defending my PhD dissertation.

The role was a great fit-- it was a lab-based scientist position, and the work I was doing was very similar to what I had pursued during my PhD and what I honestly enjoyed.

It all felt like a dream come true, as my career goal at the time was to get an industry research position, with a meaningful opportunity to have a wider impact through my work by helping to deliver medicines to patients faster through evidence-based scientific research. It was certainly not an easy journey landing this role-- I had heard from colleagues and friends how difficult it is to break out of the ivory tower without industry experience.

Towards the last six to nine months of my PhD career, I was frantically preparing to finish my dissertation, manuscript, complete the last big experiments, and on top of it to find a position relevant to my knowledge base, interests and skill set. I applied to over 80 job positions, only to be fraught by the emails I would get saying,

*"Thank you for applying, but we will not be moving forward with your candidacy."*

I did countless phone interviews, long in-person interviews for many jobs, and fortunately towards the last two months of PhD, I found a role that was a good fit, and received a job offer within one week of my interview. It was certainly a very stressful time but nonetheless the hard-work certainly paid off.

One of my primary concerns was whether I had the skills that allowed me to function and thrive outside of academia. I felt like I was pigeon-holed into a very specialized niche within my field that breaking out of it would seem difficult.

Through personal reflection and preparation, I discovered that I did have the knowledge, experience and skills that are useful for the industry roles I wanted.

One of the key skills we learn as PhD scientists is how to communicate our science well to others. This is paramount to success in every function across industries. Knowing how to organize your thoughts well, present them in a clear and concise manner, and telling a compelling story of your data and results is crucial for success.

In graduate school, we have to convince our advisors and thesis committees that our research and ideas are sound and promising, and are worth pursuing. This task is no different than when sales representatives have to convince their customers that their company's product is worth buying, or when lawyers have to procure clients for their services by marketing their legal skills.

Similarly, as an industry scientist in a discovery research group, I have to routinely deliver compelling presentations with strong scientific evidence to convince my colleagues and managers that the drug target is worth pursuing, allowing the timeline of the product development cycle to move forward, with the ultimate goal to reach to patients in need faster.

My PhD academic training helped me become well-prepared to shoulder this responsibility and improve on it every day.

As I continue to practice communicating my science with others, I became better at building professional relationships with my colleagues, peers, managers, upper management, and cross-functional teams, and larger networks. I also learned so much from them and their functions and feel very satisfied to meaningfully contribute to the organization as a whole.

Another key skill that is an incredibly valuable asset of a PhD scientist is their problem-solving mindset that drives them to solve complex problems with a sense of urgency and persistence. We become relentless in pursuing the research questions without fearing failure. In fact, we actually thrive in it, because we are not afraid to take risks and keep moving forward. This essentially drives the discovery research and innovation programs forward, because without someone actually doing the work to figure out if novel drug target are worth working on, these programs will stop and nothing will get delivered.

I routinely have to deliver on this as part of one of my performance goals. The best part is it is it all feels like solving puzzles. Every day is a different day, with different challenges and problems to solve. Figuring out what resources needs to be allocated to what projects, and how to design experiments strategically to answer the right research questions, are the skills we all learn in our academic training.

This is tremendously valuable in the industry context as well. I have the ability to find the answers to complex questions, to find novel and creative solutions, to generate new valuable data, improve on processes that may have become outdated, or require new fresh perspectives. I am able to critically reason research ideas, by applying my own knowledge and experience. At the same time, I am able to leverage my team's expertise, and efforts, and build on working together to bring the solutions forward.

In concluding, I hope that through the snippets of my experiences that I shared above, I was able to show you that you too are able to take leaps forward into applying to those dream industry jobs that you always wanted and be successful in your scientific careers outside of academia.

GEORGIA PATHWAYS
MAGAZINE

## Content Invitation

Georgia Pathways™ STEM Magazine requests the privilege of including your content or the content of your students in upcoming issues. This is a great opportunity for students to be published and for educators and industry professionals to share their insights and wisdom regarding careers across Georgia.

If you have questions, please contact the publisher at:

wayne@tagonline.org

770.370.1905

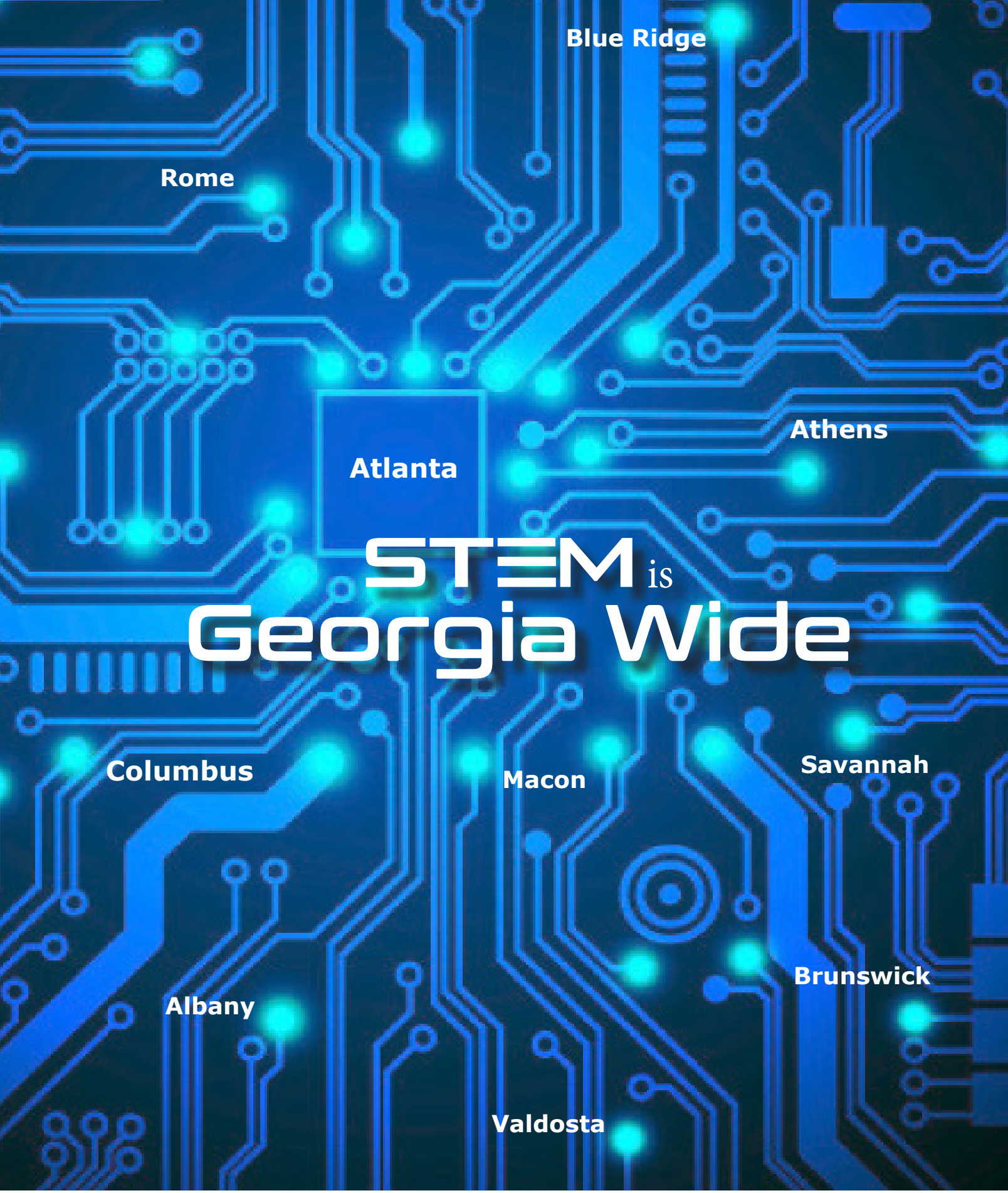
Content submissions:
- Word.doc format

- **Completely** revised and spell checked.

- Everything as an attachment.

- Unlimited electronic distribution to everyone in Georgia.

Advertising:
- Full page ads are available monthly at a very low cost.




TAG
Technology Association of Georgia

TAG | TAG-Ed
Education Collaborative