

newscience

NEWS FOR MEMBERS AND FRIENDS OF THE SAINT LOUIS SCIENCE CENTER

WINTER 2021-2022

Marie Curie, “female STEM superhero,” was the first woman to win a Nobel Prize, the only woman in history to ever win it twice, and the only human to ever win a Nobel Prize in two different sciences.

“

I WAS TAUGHT THAT THE WAY OF

PROGRESS

WAS NEITHER SWIFT NOR EASY

”

MARIE CURIE



ONE BUILDING | CELEBRATING 30 YEARS...AND BEYOND

30TH ANNIVERSARY
SPECIAL EDITION

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Connect with curiosity.

Dear Friends of the Saint Louis Science Center,

As we come to a close of another year, I'd like to take a moment to reflect on 2021. This past year has continued to show that STEAM—science, technology, engineering, art and math—is part of our daily lives. From working to end a global pandemic and landing the *Perseverance* rover on Mars, to keeping us connected with family and friends and reshaping both where and how we learn and work, STEAM touches so much of the world around us, even in ways that we may take for granted...or maybe never even realized.

Here at the Science Center, there are always opportunities to discover more about our world through science, from our distant past, up to today and even beyond. And as I reflect on another year of discoveries and advancements in STEAM, I'm humbled to think about all the innovation taking place right here in St. Louis.

In this issue of *NewScience* read about some of the local STEAM industries revealing how science in St. Louis is thriving (as well as how STEAM supports our region). You can also learn more about our newest special exhibition, *Tyrannosaurs: Meet the Family*, which invites you to step back in time to marvel at these ancient creatures and explore the modern science and technology paleontologists use to study them.

Science Today explores artificial intelligence with Dr. Keith Miller. Our Gallery Spotlight takes a deeper look at Makerspace and its important role in informal STEAM education. Plus, see what's new at the OMNIMAX® Theater and McDonnell Planetarium, including the return of our popular Laser Light Shows.

And no issue of *NewScience* would be complete without stories from the YES Program. Whether they're creating electric go-karts or literally taking to the sky, our YES Teens continue to demonstrate the limitless possibilities of STEAM.

Finally, our annual honor roll recognizes our most impactful donors and supporters who have contributed over the past year. The Science Center could not do what we do without the support of our philanthropic partners, our members and our community, and I'd like to thank each of you for enabling us to pursue our mission despite challenging times like these.

From all of us here at the Science Center, happy holidays, warmest wishes, and we can't wait to see you. There's so much to discover, and I can't help but say, full STEAM ahead.



Sincerely,

Todd Bastean
President and CEO

To ignite and sustain lifelong science and technology learning. Mission of the Saint Louis Science Center

Connect with us for updates, special events and fun science.



Hours

Thursday–Saturday 9:30am–4:30pm
Sunday 11:00am–4:30pm
Closed Tuesdays & Wednesdays
Holiday Hours: See Calendar Insert

Contact

314.289.4400
slsc.org
Saint Louis Science Center
5050 Oakland Avenue
St. Louis, Missouri 63110

Membership

Services & Sales: 314.289.4491
slsc.org/membership
memberships@slsc.org
Member Reservations: 314.289.4424

Reservations

Advance Sales & Group Reservations:
314.289.4424

Education

Field trip information:
slsc.org/field-trips
Educator Resources:
slsc.org/educator-resources
Programming information:
education@slsc.org

Events

Host your next private event at the Saint Louis Science Center. Services and catering provided by Saint Louis Science Center Events. For information: 314.533.8179

Accessibility

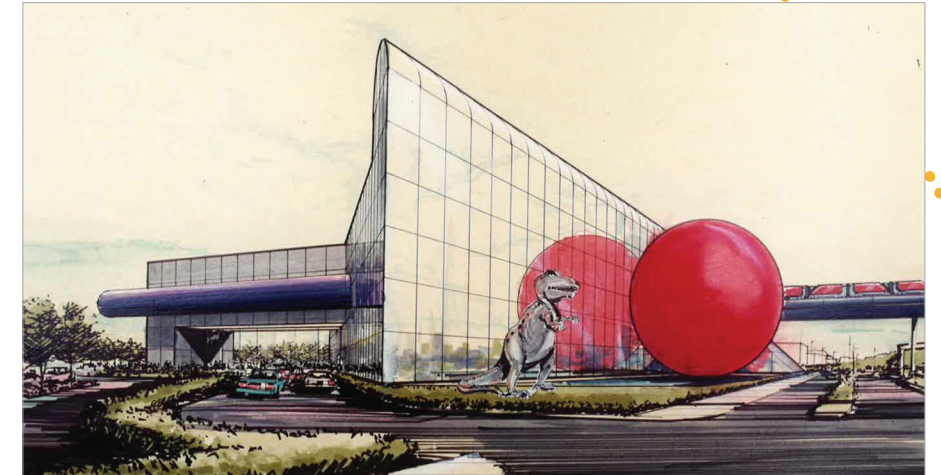
Complimentary wheelchairs and strollers available in the lobby. Motorized scooters are available for a rental fee. Personal Hearing Assistance Devices available at the OMNIMAX® Theater and Planetarium. Captiview captions devices available for all OMNIMAX films.

Official Partners

The Saint Louis Science Center gratefully acknowledges the support of our Official Partners.



Features



4 Anniversary

As we celebrate 30 years of the Saint Louis Science Center's Oakland Building, we turn our attention to the next 30 years and beyond. Learn about STEAM in St. Louis, see how science supports our region and discover three STEAM areas that could play a role in St. Louis' future.

8 Membership Matters

Pay it forward by gifting a membership to someone you care about this holiday season. Plus, learn about our upcoming Member Access Portal and exclusive member events.

10 Science Today

The reality of artificial intelligence is here to stay. We talk to University of Missouri—St. Louis' Orthwein Endowed Professor for Lifelong Learning in the Sciences, Dr. Keith Miller, about whether AI has been living up to the hype that society has created around it.

22 Community

Whether they are taking to the skies and learning to fly planes in their Aerospace Component or learning how to build go-karts and race them in competitions, the Youth Exploring Science (YES) teens are busy learning different STEAM skills and careers.

28 Partnership

Read about the Science Center's Institutional Advancement team and their trip to the Farm Progress Show, their travels to meet with our GROW Gallery agricultural partners and the Science Center's 8th Annual Golf Tournament.



Engage with *NewScience* in a more interactive way. If you see this icon, head to slsc.org/newscience for extended digital content.

ST. LOUIS IS STEAM POWERED.

The future is powered by STEAM, and St. Louis is increasingly at the center of science and technology. Today, the St. Louis region is home to a variety of science and technology companies, research institutions, healthcare entities and more.

The St. Louis region offers several strong industry groups powered by science and technology. Take a look at some of the local science and technology industries that are putting STEAM to work, as well as a few that could play an important role in the future of the St. Louis region.



► Biomedical & Health Services

This sector includes healthcare institutions, pharmaceutical industries, biotechnology companies and more. It also includes academic institutions like Saint Louis University and Washington University, contributing scientific knowledge through biomedical research investigating everything from genomics and cancer to HIV and Alzheimer's disease.

Local startups like VaxNewMo, Edison Agrosiences and Wugen are researching and developing next-generation vaccines, innovative plant-based industrial materials and cellular therapies for treating cancer.

In September of 2020, the U.S. Economic Development Administration awarded BioSTL with a \$1.5 million grant to launch the Center for Defense Medicine.

THIS SECTOR EMPLOYS NEARLY 200,000 PEOPLE IN THE ST. LOUIS REGION AND INCLUDES...

SSM Health | BJC Healthcare | Pfizer | Express Scripts | BioSTL



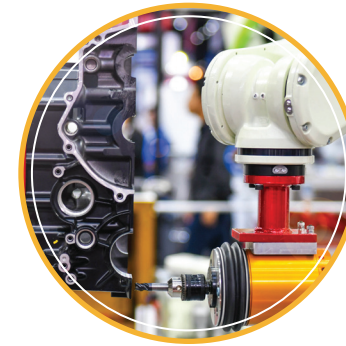
► Aerospace Vehicles, Automotive and Defense

This sector involves large-scale manufacturing, servicing and the advanced production of defense technology including fighter jets like the F/A-18 Super Hornet and F-15 Strike Eagle, light automotive manufacturing for cars and trucks, and foundries producing metal components used in construction.

Scott Air Force Base, located in St. Clair County, Illinois, also plays an important role in the St. Louis region through connections to cybersecurity, defense and geospatial intelligence.

THIS SECTOR EMPLOYS OVER 23,000 PEOPLE IN THE ST. LOUIS REGION AND INCLUDES...

Boeing | Lockheed Martin | General Motors | Raytheon Technologies | Northrop Grumman



► Advanced Production

This field includes smaller scale manufacturing and production focused on a variety of products and services that encompasses consumer and commercial products, food production, as well as software and mechanical engineering. Examples of St. Louis' advanced production field include agricultural processing and manufacturing, electrical equipment and heavy machinery, as well as chemical products, information technology and more.

THIS SECTOR EMPLOYS OVER 57,000 PEOPLE IN THE ST. LOUIS REGION AND INCLUDES PRODUCTS LIKE...

Engines, turbines, and electrical equipment | HVAC and refrigeration equipment | Rubber products | Structural metals used in construction



► Advanced Business Services

Fields like insurance, health management and finance technology (or "fintech") have a strong presence in St. Louis, too. Companies in this area benefit from (and often rely on) advancements in information technology and the software industry.

These fields require a workforce skilled in STEAM areas like computer science, mathematics and data science that support an understanding of the financial market, healthcare operations and more.

THIS SECTOR EMPLOYS OVER 240,000 PEOPLE IN THE ST. LOUIS REGION AND INCLUDES...

Wells Fargo Advisors | Stifel Financial Corporation | Express Scripts | Centene | Edward Jones | Square

COULD THESE THREE FIELDS SHAPE THE FUTURE OF ST. LOUIS?

Recent reports have indicated that St. Louis also has a number of commercial STEAM fields that could prove to boost the region's economy in the coming years.



1 GEOSPATIAL

This field utilizes location data for solutions to food production, climate change, defense and more.

Scheduled to open in 2025, the National Geospatial-Intelligence Agency's \$1.7 billion Next NGA West project in north St. Louis will be home to an expected 3,000 workers and represents the biggest federal investment project in St. Louis' history.



2 FINTECH

The fintech sector uses computer sciences and new technologies to impact the efficiency of financial

systems and services from mobile payments and banking to digital lending, cryptocurrency and more.

A recent expansion by notable fintech company Square in downtown St. Louis has kickstarted the creation of the NOW Innovation District. Located in the North Washington Ave. area, this development could hold great potential for additional jobs in the coming years as fintech startups continue to grow.



3 AGTECH

Using a variety of STEAM insights and technologies, the agriculture technology (or "agtech") field impacts

agriculture by helping farmers, food producers and more improve crop yields and increase efficiency.

Noteworthy St. Louis agtech entities include Bunge and Bayer Crop Science, as well as nonprofit research organizations like the Donald Danforth Plant Science Center, the United States' largest plant science institute.



TYRANNOSAURS

MEET THE FAMILY



NOW OPEN! | SPECIAL EXHIBITION—THROUGH JANUARY 24TH

Members Receive 50% OFF Tickets!

\$7.50 member | \$14.95 non-member

An exhibition created by the Australian Museum
and toured internationally by Flying Fish



The *T. rex* is one of the world's best-known dinosaurs, but many do not know that it is just **one** type of tyrannosaur.

At *Tyrannosaurs: Meet the Family*, guests can explore more than 25 dinosaurs in the tyrannosaur's family tree. Come face-to-face with a life-sized *T. rex*, see a dramatic array of fossils and casts of tyrannosaur specimens, run for your life in a virtual experience, hatch a dinosaur egg and more in this immersive, multimedia exhibition that sheds new light on these ancient carnivores.

The special exhibition features Scotty, a life-sized replica of a *T. rex* skeleton discovered in 1991. She is the heaviest and oldest *T. rex* currently on record. When she was alive, she was almost 20 feet tall, nearly 40 feet long and tipped the scales at more than 19,000 pounds.

Additionally, guests will learn about traits specific to tyrannosaurs, such as fused nasal bones, D-shaped teeth in cross section, a special type of hip bone and longer hind limbs. Behind the stories of these ancient carnivores is astonishing science!

Visit slsc.org/tyrannosaurs.



Know before you go! Learn about fossils and tyrannosaurs in this educational guide at slsc.org/tyrannosaur-education.



Are there dinosaur fossils in Missouri?

Well, just one (*currently*)!

The geography of Missouri doesn't lend for the best dinosaur discoveries. Most of the geological time layer that is exposed to the surface is too old to contain dinosaur remains. However, Missouri can claim one major dinosaur fossil discovery as our own—the hadrosaur. In the 1900s, this fossil was located in Southeastern Missouri where rock from the Cretaceous period (66 million years ago) was uncovered. The fossil was then preserved, and as a result the hadrosaur is Missouri's state dinosaur!

So what is Missouri's geologic time scale?

The majority of layers in Missouri originates from the Ordovician period (443 million years ago), the Mississippian period (323 million years ago) and the Pennsylvanian period (298 million years ago). The St. Louis region primarily consists of surfaces from the Mississippian period. This means any plants or animal fossils, especially ammonites, crinoids and Archimedes discovered lived during this time period.

Can I help find fossils?

Yes! If you are interested in fossil hunting in the St. Louis region, we highly recommend getting involved with the Eastern Missouri Society of Paleontology. They have a wealth of information on local fossil-hunting sites that are safe, legal and often have incredibly interesting specimens. Rick Poropat is the treasurer of the Eastern Missouri Society of Paleontology and we are lucky to have him as a frequent volunteer at the Science Center Fossil Prep Lab. Come visit him on Thursdays for stories, discoveries and more information on how you can get involved.





Holiday Member Appreciation Night

THURSDAY, DECEMBER 9 | 5:30PM-8:00PM

We are excited to welcome back our ever popular Holiday Member Appreciation Night. To show our gratitude for your support this year, we invite you to this special holiday event exclusive for our members. With every membership, you have helped develop immersive exhibits, create educational programming and pique the curiosity of the next generation of STEAM professionals. **This special night is our thank you to you!**

- * Learn about the tyrannosaur family in our newest exhibition, *Tyrannosaurs: Meet The Family*
- * Experience our *Seasons Greetings* star show in the Planetarium or *Dinosaurs of Antarctica* documentary film in the OMNIMAX®
- * Warm up with holiday drinks and treats
- * Learn about the American chestnut (while sampling chestnut-infused honey in GROW) or the science behind hibernation in the Life Science Lab
- * Take home a jingle bell from the Discovery Room and a laser engraved ornament from Makerspace
- * Receive a special member gift and other great giveaways

RESERVE YOUR SPOT



▶ TYRANNOSAURS: MEET THE FAMILY SPECIAL EXHIBITION

Every Half Hour | \$7.50 per member
Reservations Required



▶ DINOSAURS OF ANTARCTICA FILM

Documentary Film | Free
Reservations Required | 5:30pm & 7:00pm



▶ SEASONS GREETINGS STAR SHOW

Planetarium Star Show | Free
Reservations Required | 6:00pm

Again, thank you for continuing to support science. Thank you for continuing to support St. Louis. And thank you for continuing to support the Saint Louis Science Center. Your membership makes a difference.

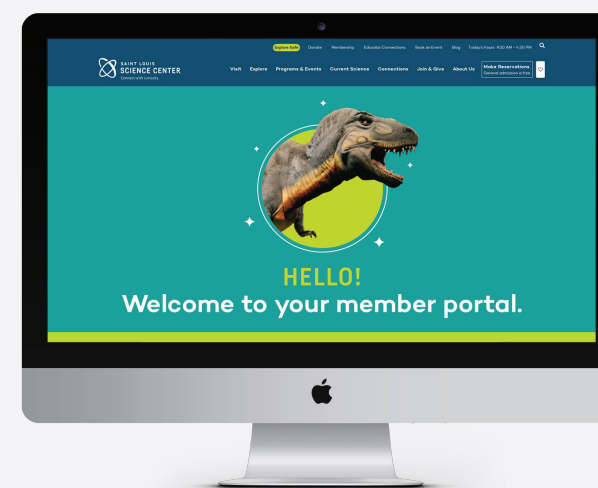
Give the Gift of Membership

Gifting a Science Center membership unlocks a full year of benefits for someone you care about, whether they're a budding paleontologist or a lifelong learner.

Plus, a membership purchase includes a limited edition, members-only Science Center plush dinosaur.*

VISIT slsc.org/memberships to gift a membership today. To ensure you get your present on time, all orders must be submitted by December 8.

*While supplies last.



Your New Membership Benefit is Almost Here!

We're can't wait for you to discover your latest membership benefit—the Member Access Portal.

So what is this new benefit?

The Member Access Portal is an exclusive website where members can view unique science content, members-only exclusives, upcoming events and sales and so much more. You can satisfy your curiosity 24/7.

Coming Early 2022

Upcoming member nights.

SAVE THE DATE

JANUARY 13

MEMBER PREVIEW: WINGS OVER WATER

OMNIMAX Documentary Film
For information, please turn to page 20.

JANUARY 27

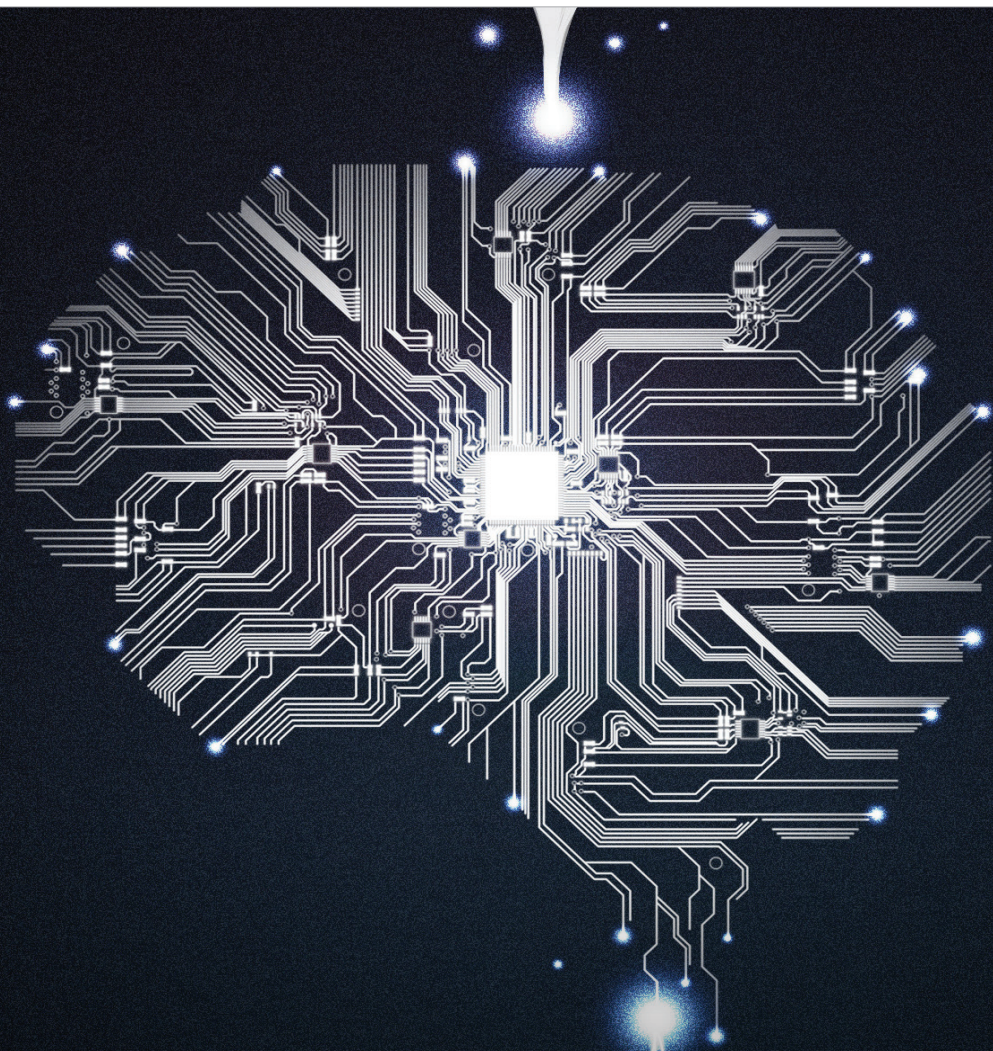
CHAT WITH A SCIENTIST: AI

TBD | FEBRUARY 2022

COLLECTIONS TOUR: NAVIGATION & ENGINEERING

FEBRUARY 24

MEMBER PREVIEW: STARS AROUND THE WORLD PLANETARIUM STAR SHOW



ARTIFICIAL INTELLIGENCE (AND ALL THAT HYPE)

Information provided by Keith W. Miller, Ph.D., Orthwein Endowed Professor for Lifelong Learning in the Sciences at the University of Missouri-St. Louis



As AI devices become increasingly capable, many ethical issues arise. How should we treat these sophisticated machines; how should they treat us?

Artificial Intelligence (also known as AI) has had a long history of “hype cycles.”

Since the 1950s, both scientists and the public have periodically become convinced that AI is about to make dramatic advances that will revolutionize our lives. Then, when AI fails to deliver on many of those promises, interest (and research funding) fades. Keith W. Miller, Ph.D., Orthwein Endowed Professor for Lifelong Learning in the Sciences at the University of Missouri-St. Louis shares his thoughts and research on AI and the current new era of AI enthusiasm.

In the past few years, published research papers and articles in the public press about AI have increased dramatically. Is this just another hype cycle? Perhaps, but there are hints that AI may be fulfilling enough of its promises this time, so that things really are changing in a more permanent way.

“If you want a machine to behave in a manner that suggests it has ‘intelligence,’ one strategy is to analyze how humans process information, and have the machine (as much as possible) mimic the human process. Another strategy is to devise algorithms (detailed instructions that tell the computer what to do) that make the machines act as if they were intelligent, essentially ignoring any questions about whether the machine is intelligent in the same way that humans are intelligent. These strategies need not be mutually exclusive; a researcher might combine them in some clever way to achieve AI goals,” Miller says.

In the past few years, a strategy known generally as “machine learning” has become increasingly popular with AI researchers and AI programmers. The strategy is broad enough that people define the concept differently. However, the big idea is that computers are excellent at storing and accessing large collections of data, much better than humans at this particular task.

Continued on the next page. →



AI researchers explore the intersection of human intelligence and computer algorithms.

(continued)

Machine learning uses this capacity of computers to either teach a computer how to do something, or to enable the computer (in a limited sense) to teach itself.

In order to use machine learning, a programmer identifies a set of inputs (data) that the AI is supposed to process. At first, the programmer delivers one set of inputs, and “teaches” the AI what the proper response should be to that set of data. Next, the programmer delivers another set of inputs and again indicates to the program what the correct response should be to those inputs. Behind the scenes (that is, within the data structures of the program), the machine learning algorithm is establishing connections between different aspects of the data, including placing “weights” on various links between data. If all goes well, by adjusting those weights and connections during the learning process, the program can start to make increasingly accurate “guesses” about the proper response to the next input.

After training, the program’s internal representation of reality can be frozen, and then the program can give (hopefully) appropriate responses for each set of inputs presented to it. However, if the human programmer can devise a way for the machine to recognize whether or not its current answer is good or bad, then the machine can keep adjusting its internal states, thereby extending its learning indefinitely. Devising metrics that enable this continuous self-evaluation (such a metric

is sometimes called a “figure of merit”) is a lively area of AI research. A good thing about allowing the program to keep learning is that there is a potential for increasingly helpful responses from the program, as it adjusts its answers to match changing circumstances. A potentially bad thing about continuous learning is that the program might wander off into giving unhelpful, or even harmful, responses when no longer under direct human control.

A good machine learning program can achieve impressive results by substituting brute force computer processing for complex, intricate programming by humans. In the recent past, computers have defeated chess grand masters and the highest ranked humans on the game GO—a domain in which humans thought they would remain superior over computers. These recent AI programs used machine learning, among other strategies, to defeat humans at these games.

Machine learning has led to other advances in AI. For example, the algorithms in driverless cars that recognize dangerous situations, and quickly deliver appropriate responses to different traffic configurations; AI programs diagnose human diseases given inputs about a person’s vital signs and test results; and different machines identify, and in some cases fix, computer malfunctions. Machine learning algorithms help computers participate in written and oral conversations. And machine learning predictions about changes in financial markets are helping investment professionals to cash in.

Machine learning is not without its failures, some of them spectacularly public. For example, in 2016 Microsoft placed a chatbot named “Tay” on to the Internet, inviting the public to teach Tay to chat by interacting with the bot via text messages. Unfortunately, some people who interacted with Tay taught it to think and act badly; Tay sent out sexist and racist messages. Soon, Tay was taken off the Web, and Microsoft apologized.

“The Tay case dramatically illustrated an important ethical (and perhaps legal) issue that has to do with AI in general, and with machine learning in particular: when a machine becomes so sophisticated that it can operate largely without direct human supervision, who then is responsible for the behavior of that machine? Is the original programmer responsible for any subsequent behaviors? Is whoever teaches the computer also accountable? At some point, does the machine itself bear some responsibility for its own actions?” Miller asks.

There are no authoritative, final answers to many ethics questions about AI machines, including Web chatbots, physical robots and phone systems, all of which can now interact with humans in ways that used to be confined to human-to-human communication. Are we entering a world where a new species of entities is entering into the society of humans? Some scholars (both in computer science and philosophy) think that machines will never become peers or rivals of humans; other scholars are convinced that such a thing is not only possible, but that it is inevitable. Still other scholars warn that it may be possible, but we should not let it happen. As these debates rage on, AI machines are becoming ubiquitous: on our smartphones, as we check out of the supermarket, as we surf the Web and when we apply for a credit card—machine learning computers are making decisions that affect us. As far as we know, humans are still in charge; however, some people who have carefully studied the past and future of AI are worried.

“

I am one of those ‘worried’ people, but I am also cautiously optimistic. I think we should be intentional about how AI is introduced to our world.

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“I am one of those ‘worried’ people, but I am also cautiously optimistic,” Miller shares. “I think we should be intentional about how AI is introduced to our world. We should remember that computers should be evaluated on their contribution to humanity, not vice versa. When a company introduces a new technology, we should feel free to say ‘no, thank you’ even if the technology becomes fashionable, if we think its potential harms outweigh its advertised benefits. And we should encourage politicians to impose reasonable regulations on technology companies (who at the moment are largely unregulated). By moving forward with caution, perhaps we can live harmoniously with these increasingly sophisticated AI artifacts. Let’s be careful out there!”

STEM EXPERT SPOTLIGHT

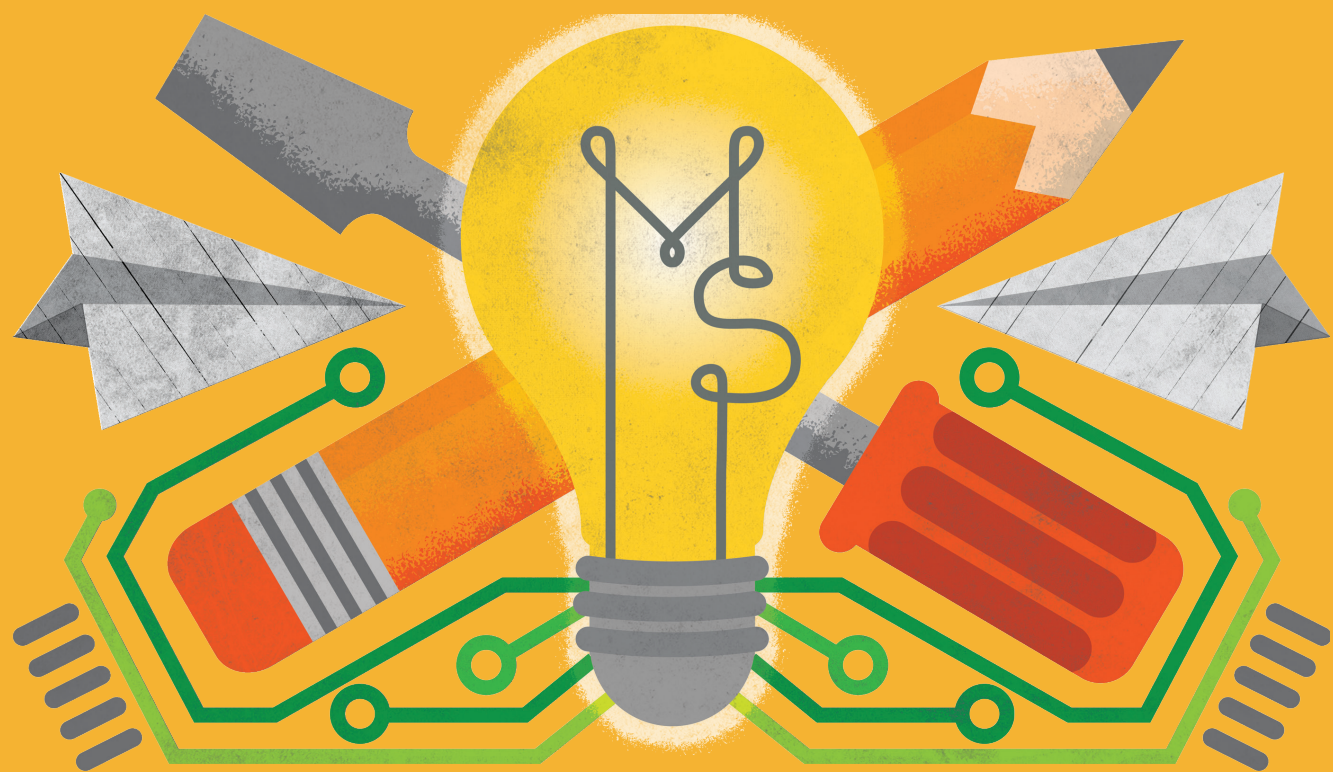


Keith W. Miller, Ph.D., is the University of Missouri–St. Louis Orthwein Endowed Professor for Lifelong Learning in the Sciences. He has a BS in Education, an MS in Math, and a Ph.D. in Computer Science. Dr. Miller is a professor both in the Computer Science Department and in the College of Education. The Saint Louis Science Center is his community partner, and he can often be found staffing a table at the Science Center’s First Friday events. Dr. Miller’s research interests include computer ethics, online learning and software testing. For more details about Dr. Miller, please see learnserver.net/faculty/keithmiller.

KEITH’S FAVORITE AI MOVIES

(in chronological order)

- 1 **METROPOLIS** (1927)
- 2 **2001: A SPACE ODYSSEY** (1968)
- 3 **WESTWORLD** (1973)
- 4 **THE TERMINATOR** (1984)
- 5 **THE MATRIX** (1999)
- 6 **BICENTENNIAL MAN** (1999)
- 7 **A.I. ARTIFICIAL INTELLIGENCE** (2001)
- 8 **I, ROBOT** (2004)
- 9 **WALL-E** (2008)
- 10 **ROBOT & FRANK** (2012)
- 11 **HER** (2013)
- 12 **EX MACHINA** (2014)



PURPOSEFUL PLAY is the way.

Makerspace is an interactive community-oriented space at the Saint Louis Science Center where you can create and learn skills using a variety of tools and materials. The free gallery is located on the Second Floor and is recommended for kids 7 and up.

Trent Smith, Manager of Makerspace, has been engaging young “makers” since 2016, and the most common question that he gets asked is: **“What does the Makerspace do?”**

Whether developing Rube Goldberg machines with schools or teaching kids how 3D printing works, the Makerspace gallery is an area for kids to explore ideas, apply a process and come up with a solution. More specifically, “we teach kids to think outside of the box through various workshops like *Coding*, *Stop Motion Animation* and even building with cardboard,” Trent says.

This answer is generally met with excitement. “So, you get paid to play all day?” In essence, yes. And to kids (and some adults) play is very important work.

Mark Twain said, “Work and play are words used to describe the same thing under differing conditions.” In the Makerspace, it is our responsibility to provide children with the conditions of purposeful play. If we can guide kids to explore and discover through play, we help prime them to be creative, social, problem-solving adults. These skills can even provide a foundation important for unlocking opportunities in today’s 21st century workforce.

What is interesting to note about these kids is some will be working in careers that do not even exist yet. The concept of Makerspace is to harness children’s innate desire to be creative and to explore; to guide their open-ended thinking, encourage them to try new things, teach them to accept failure, adjust and move forward; and most importantly, to show how to interact with peers while doing so.

Today, we first start with having fun and exposing children to the confidence that comes from doing something successfully for the first time. It could be coding, stop motion animation...or even building something out of cardboard.

Or simply put, *play*.

Makerspace Classes

Laser Engraved Holiday Decorations

December–January 10 | 2–4pm

December is Laser Engraved Holiday Ornaments. While supplies last. Limit 3 per family/group.

Intro to Carpentry

January 14–February | 2–4pm

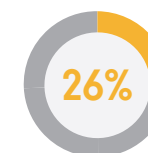
Join us in our first ever woodworking program. Guests will use reclaimed wood and traditional tools to learn about an age-old practice. Recommended for guests age 7 and up.

For more information, visit slsc.org/makerspace.

DID YOU KNOW?



AN ESTIMATED 135 MILLION U.S. ADULTS ARE “MAKERS”



26 PERCENT OF U.S. CITIES HAVE MAKERSPACES



ESTIMATED 2,000 MAKERSPACES AROUND THE WORLD*

*Source: 2016 National League of Cities report titled “How Cities Can Grow the Maker Movement”



WHAT'S NEW? Galleries & Programs



Energy Stage Shows

Join us for exciting and entertaining demonstrations using fire, electricity and more. Educators will ignite and deepen the curiosity of the Energy Stage audiences by showcasing all areas of STEAM.

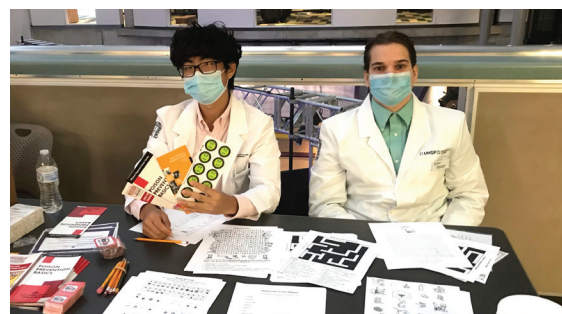
Tesla Tunes | Our Changing Earth | Creepy Chemistry

For more information, visit slsc.org/energystage.



GROW LAB

What does it take to grow food and medicinal plants indoors? Is this a feasible way to produce food now and in the future? Check out the GROW LAB in the GROW Pavilion and see for yourself. The GROW LAB is home to our very own science experiments. The GROW team is using both hydroponic and soil-based systems to determine which method is more effective for fruit and flower production. See what plants we are growing and make your own observations. The GROW LAB is made possible through donations from Hawthorne Garden Company and Grow Gear.



Life Science Lab

St. Louis College of Pharmacy | This Winter

Welcome Back, St. Louis College of Pharmacy! Students from the St. Louis College of Pharmacy are returning this winter to engage guests of all ages in conversations about health and medicine. Explore topics such as prescription safety, how medicine is made, and the differences between antibiotics and vaccines through hands-on activities led by future pharmacists. Students will be in the Life Science Lab Atrium on Fridays from 10:00am to 4:00pm.



Discover Science with Me Sessions

Fridays–Sundays
\$20 Members | \$25 Non-Members

Our early childhood program, specifically designed for young scientists, ages three to six, is aimed at providing opportunities for little ones and their caregivers to wonder, play and discover together.

To view a list of topics, dates and session information, please visit the calendar insert within *NewScience*.

NEW PLANETARIUM TUNNEL EXHIBIT

INSIDE THE VAULT

Step inside the vault and take a peek at treasures from our very own Saint Louis Science Center Collections. This is the largest display of Collections objects in the Science Center's 30-year history and includes many items that the public has not seen up close before. Several objects were donated by individuals who were collectors and provide us with some interesting artifacts and specimens to examine.

So what's in the vault? This exhibition will feature the collections of six individuals, highlighting the best and most interesting artifacts and specimens in each. Included are stunning minerals from the Hansen Mineral Collection, exquisite lamps from the Morton Lighting Collection that helps to tell the story of lighting technology over the past 2,000 years, and the Barker Shell Collection which boasts shells with a variety of colors, sizes, shapes and patterns from across the world's oceans. Also included is the fascinating Davis Miniature Collection with miniature statues and objects representing both human and animal forms, a variety of plant and animal fossils from the Stinchcomb Fossil Collection and finally the Grimm Elephant Collection, a collection focused on this unique animal.

Join us *Inside the Vault* to explore these fascinating artifacts for yourself.

FIRST FRIDAYS *are back!*

All First Friday events will take place from 5:00pm–9:00pm
 Visit slsc.org/first-fridays for updates and schedules.

Please note: There will be no January First Friday. First Friday events will follow all existing Saint Louis Science Center health and safety guidelines, including capacity guidelines. Visit slsc.org/expo safe.



DECEMBER 3 Star Wars: Boba Fett and the Mandalorians

Get ready for a night filled with bounty hunters, Mandalorians and rebels. Experience special photo ops and costume characters from the 501st Legion and hear how this group designs and builds their own realistic props and costumes. Discover the real science behind Star Wars with educational activities and a building-wide game, or test your knowledge at trivia. End your evening with a screening of episodes of *The Mandalorian*. Don't forget to keep an eye out for Grogu!



FEBRUARY 4 Mystery at the Museum

We all love a good mystery. On February 4, join us to solve a Mystery at the Museum. The evening will include a building-wide Clue-style game, trivia, featured presentations and educational activities that will require the use of your "little grey cells." End the evening with a screening of an Agatha Christie film favorite.

9:30AM–4:30PM | FEBRUARY 26

SciFest: Engineering Expo

Celebrate Engineers Week 2022 with a free one-day event showcasing the creative problem-solving process used in engineering. Meet real engineers who build, invent and impact the world around us. Find inspiration for applying your own creative abilities.

You can visit slsc.org/scifest for the most up-to-date information.



SAINT LOUIS SCIENCE CENTER
Esports
 X O □

COMPETITIONS & OPEN PLAY
 Unlock the gamer in you.

Visit slsc.org/esports for schedules on upcoming competitions, Enrichment Programs and open play sessions.

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SLUH
 ESPORTS

The Science Center Hosts SLUH Esports

The Saint Louis Science Center was proud to host the St. Louis University High Jr. Bills Esports team in our gaming arena this fall.

Led by manager David Callon, the Jr. Bills competed in Super Smash Bros. Ultimate and Rocket League on both varsity and junior varsity levels. The Jr. Bills Esports team was very successful, with some of St. Louis' most elite gamers competing multiple times a week against other Missouri high school students.

In the spring, the SLUH esports team will premiere two new teams, including Smash Bros. Crew and League of Legends. These teams will look to continue the tremendous success of the past semester as they compete against local schools in some of the most popular game titles in the world. **Congratulations to the Jr. Bills Esports team on their inaugural season, and we look forward to working with them again as the world of esports continues to game on.**

Coming Soon! HOCKEY: Faster Than Ever

Experience the thrilling history, culture and science of hockey in *HOCKEY: Faster Than Ever*, coming in 2022 to the Saint Louis Science Center.

In this exciting new special exhibition, get immersed in the world of hockey with more than 20 hands-on interactives including the "Hockey Science Lab." Test your knowledge about hockey with a scaled-down replica rink and experiment with speed, balance, reaction time and all the skills important to the game of hockey.



The touring exhibition, *HOCKEY: Faster Than Ever*, was produced by Flying Fish in coordination with the Montreal Science Centre, and is toured internationally by Flying Fish.



Members enjoy free documentary film tickets at the OMNIMAX® Theater

Immerse yourself in one of our educational documentary films that will take you right out of your seat and into the ancient green lands of Antarctica or through the wild of North America. For information on shows and schedules, visit slsc.org/omnimax for film schedules.



OPENS JANUARY 14 | DOCUMENTARY FILM

Wings Over Water tells the story of the epic journeys of three amazing bird families—the Sandhill Crane, the Yellow Warbler and the Mallard Duck—with extraordinary footage of their fascinating behaviors. Be captivated by the triumphs and challenges of these remarkable creatures that defy all odds and soar across mountains, deserts, cities and forests as they head home to raise their young.



NOW PLAYING | DOCUMENTARY FILM

Roam the primitive forests and thick swamps with bizarre dinosaurs and colossal amphibians. Join intrepid Antarctic scientists on a quest to understand the ice continent's profound transformation—and to predict the future as humans drive dramatic change.



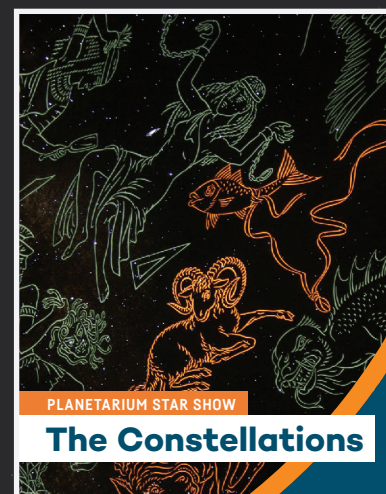
NOW PLAYING | DOCUMENTARY FILM

A non-stop ride via kayak, bike, train, hot air balloon, zipline and more, *Into America's Wild* explores some of the most beautiful but little-known landscapes of North America.

McDONNELL PLANETARIUM

Star and Laser Shows!

Experience the night sky in our world-renowned James S. McDonnell Planetarium. Enjoy a live sky view of the stars or jam out to music in a spectacular laser show. For more information on schedules and shows, visit slsc.org/planetarium.



◀ LIMITED RUN
THE CONSTELLATIONS
OPENS JANUARY 6

Explore the patterns that change overhead throughout the year in this live star show.

▶ BACK FOR THE HOLIDAYS
SEASONS GREETINGS
NOW–JANUARY 1

Explore the nature of our seasons and why the winter solstice has long been a time of celebration in this live star show.



◀ LIMITED RUN
LASER LIGHT SHOWS
DECEMBER 27–31

The laser show series fuses music, laser artwork, immersive lighting and 3D-atmospheric effects to create an unforgettable live experience.

\$9.95 Members | \$10.95 Non-Members

Visit slsc.org/lasers for schedules and information.
Tickets On Sale December 3.

ASTRONOMY DATES!

Come to the Planetarium to learn more about these special events.

DECEMBER 13–14
Geminid Meteor Shower Peak

The peak of the Geminid meteor shower brings the chance to see meteors, or shooting stars, overhead each December.

DECEMBER 21
Winter Solstice

On this day, the Sun reaches its lowest point in our sky, signaling the star of winter.

JANUARY 7, 2022
Mercury Greatest Eastern Elongation

Mercury will be well placed for viewing this night in the western sky at sunset.

FEBRUARY 1, 2022
Lunar New Year

The new moon on February 1st marks the start of a new year for over 2 billion people worldwide.

YES Teens create electric go-karts

With the support of partnerships with Frank Leta Automotive and Toyota USA, teens in the Youth Exploring Science (YES) Program had the opportunity to build and drive go-karts over the summer. As guests of World Wide Technology Raceway Gives, the YES Teens attended safety and driving sessions at the KartPlex during late July.



As the next step in their introduction to motorsports and hands-on engineering, the teens were taught how to assemble a pair of Margay Racing Ignite go-karts by current and former kart racers and their pit crews. In mid-August, they also were invited to meet at the track during practice laps for the upcoming Bommarito Indy Car 500, gaining valuable engineering experience for high-end racing machinery from the experts and about existing careers.

From left: One of the many Margay Racing mentors instructing YES teen Bashir Alford in the assembly of a Margay Ignite racing go-kart.

At the Raceway's STEM Lane event, during NASCAR Camping World Truck Series 200, Indy Lights, and Vintage IndyCar races, the YES Teens proudly displayed a prototype of the electric go-kart that will be designed and fabricated this school year.

From left: Keith Freber (Owner of Margay Racing), Zion Bradsher (YES teen), Scott Blind (primary sponsor of Ignite Autosport).



During their capstone event with World Wide Technology Raceway Gives, on August 29, the YES teens came in third at the Junior 500 Championship, an Ignite kart race for local teens, racing the two karts that had been assembled the week before.

In the winner's circle, from left: YES teens Zaire Bradsher, Zion Bradsher and Walter Dunlap IV, with their team coach and mentor from Margay Racing.



YES Teens Take to the Sky

© Photo credit: The Aero Experience



© Photo credit: The Aero Experience



© Photo credit: The Aero Experience

Thanks to the Experimental Aircraft Association's Young Eagles Program, the YES Aerospace teens were able to fly planes in August!

Of course, there was a pilot in the plane with them—but the teens were able to fly the planes themselves for a short time.

The teens practiced all summer on flight simulators to be ready for their big moment. Thank you to their flight instructors—Carmelo Turdo, Kevin Meyer and Jeffrey Rapp. And a big thanks to David Brickhaus, who invited the teens to this event and helped them to fly his plane.

If you have a child who is interested in flying, the Young Eagles Program takes kids under the age of 18 on flights once a month during the summer.

Visit eaa.org/ea/youth/free-ye-flights for details.

“

My flight was *amazing*. I did a very good job of staying calm and believing in myself, and that is a key thing to do when doing something you love, believe in yourself so you can achieve.

The flight lasted about 30–40 minutes and me and my co-pilot were making coordinated turns, 45-degree turns, 30-degree turns and 360-degree turns.

I was really getting used to flying the plane and doing my best at staying calm. But the overall experience was great—can't wait to do it again.

Also, the flight set me on a straight path to getting me to my career and I want to thank the Science Center for making my career path start earlier than I expected.

—YES teen Ja'Mez Brown-Craig

”



Community Science Creates and Distributes STEAM Kits

Every summer, the Saint Louis Science Center's Community Science department hosts a free summer camp called Summertime Science where community organizations can bring their campers.

Due to the Covid-19 pandemic many organizations could not host field trips or had to reduce their camp capacities to allow physical distancing. Teens in the Youth Exploring Science (YES) Program sprang into action to create science kits that allowed kids in Saint Louis City and Saint Louis County to still have something engaging and hands-on to do before school started back.



With a great partnership with Saint Louis City and Saint Louis County libraries, over 1,800 science activities were distributed to area kids. Kits included three activities—Design a 3D Maze, Construct a Sky Scraper and Create a Sky Projector—along with basic supplies. Each activity was designed, packed and illustrated by the Saint Louis Science Center's YES Program. The YES Teens who selected each activity then filmed a YouTube video guiding kids on how to construct each one. Although the activities may seem simple in nature, they are harnessing each child's ability to hone in on STEAM skills like engineering, astronomy, design, critical thinking and game design. Activities were designed for kids in 1st to 8th grade.



JANUARY 15, 2022 | 10:00AM-4:00PM

Community STEAM Showcase



FREE EVENT

Join us on January 15 for our annual Martin Luther King, Jr. weekend event showcasing the diversity of the scientific community in St. Louis.

Participate in hands-on activities and presentations led by STEAM role models representing a variety of backgrounds and perspectives.

Meet the teens from our Youth Exploring Science (YES) Program.

Science and the Farm Progress Show

During the first week of September, the Science Center's Institutional Advancement team visited the Farm Progress Show, the largest international farm equipment show in the world, in Decatur, IL.



Patti LaBrott, Pat Williams, Rich Guebert, President, Illinois Farm Bureau

Illinois Congressman Rodney Davis invited the Science Center team to attend the Congressional Biofuels Summit, where Illinois Farm Bureau President Rich Guebert and American Farm Bureau President Zippy Duvall spoke on the importance of biofuels



Rich Guebert, President of Illinois Farm Bureau, speaking at the Congressional Biofuels Summit

as renewable energy. The Farm Progress Show wouldn't be complete without visiting one of our GROW Gallery founding partners, CASE IH, who renewed its partnership for six more years!



Patti LaBrott, Pat Williams and Christine Cox



Missouri Beef Industry Council Partnership Renewal

For the sixth year in a row, Missouri Beef Industry Council renewed its partnership with the Science Center's GROW Gallery. We are honored and grateful for the organization's continued support and partnership. Make sure you stop by the GROW Gallery to get a picture with the cattle mural!

Missouri Beef Industry Council is a GROW Gallery founding partner. In addition to financial support, the council provides valuable industry knowledge, ensuring Science Center members and guests see the most updated information on agriculture and food production.



Patti LaBrott, Missouri Governor, Mike Parson, Christine Cox and Pat Williams

Agricultural Partnerships Continue to GROW

In August and September, the Science Center's Institutional Advancement team traveled across the bi-state area visiting some of our GROW Gallery agriculture partners by attending meetings and conferences at the Illinois and Missouri State Fairs. At the Governor's Ham Breakfast, the IA team met with Governor Mike Parson and discussed the important agriculture education being accomplished in the GROW Gallery. Maintaining strong connections with our partners and the greater agriculture community is vital to keeping our GROW Gallery thriving!



Congratulations to the Controlled Products Systems Group for coming in first place. From left, Jim Leam, Michael Cox, Mike Gliebe and Adam Gliebe.

8th Annual Golf Tournament Benefits STEAM Programs



Second place went to the Cee Kay Supply team. From left, Tom Dunn, Mark Schoene, Ron Reichelt and Tom Collins.



Third place went to the Deloitte Services team. From left, Justin May, Scott Ward, Adam Carril and Kevin Bell.

On October 7, the Science Center held its 8th annual golf tournament, benefiting aviation and aerospace STEAM education programs, in Forest Park.

A perfect fall day played host to 110 golfers who participated in the Closest to the Pin and longest and straightest drive contests, flew drones on the course with our YES Program educators and even tried for a hole-in-one to win a car sponsored by Frank Leta. This year's tournament raffle featured over 25 prizes including Coca-Cola memorabilia, sports tickets, a weekend at the Ozarks and more. **Congratulations to all the contest winners, and a special congratulations to the tournament winners!**

SAVE THE DATE

Save the date for our 9th Annual Golf Tournament to be held on **Thursday, October 6, 2022.**



A SPECIAL ACKNOWLEDGEMENT

to our tournament chair, Daniel Ladenberger, for his continued leadership of the Science Center's tournament for the past 8 years. His longstanding dedication to the tournament has been instrumental in raising over \$600,000 for STEAM education programming to date.



STEAM Sponsors

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We would like to express our sincere gratitude to our donors and the support you provide for our continued development of innovative exhibits, educational programs and events that ignite and sustain a passion for science and technology throughout our community.

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Our world is headed

FULL STEAM TO THE FUTURE

Every day, STEAM—science, technology, engineering, art and math—plays a central role in our lives. From the smartphones we carry, to the medicines that keep us healthy, to the food that we eat and the planet we live on, science and technology intersect with just about everything, and STEAM's impact is only increasing.


Supporters like you enable the Science Center to connect with over **1 million guests each year** through open science galleries like GROW, GameXPoration and the Life Science Lab, as well as programs like SciFest and First Friday, our new Esports Program, our nationally recognized Youth Exploring Science (YES) Program and Community Science.

Discover more about STEAM's role in our world and how your support for the Science Center makes a difference for science and technology learning for today...and for the future. [Visit slsc.org/fullSTEAM](https://slsc.org/fullSTEAM).

GIVING TUESDAY

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