

## **Background on the Exhibits, Students and Competitions at the White House Science Fair**

The fourth White House Science Fair celebrates as honored guests 100 students from more than 30 states, representing over 40 different competitions and organizations that work with students and inspire them to excel in science, technology, engineering and math (STEM) subjects. Approximately 30 student teams will have the added opportunity to exhibit their projects. In addition, senior Administration officials and leading STEM communicators, advocates, and educators will attend the White House Science Fair and meet the students.

### **Expected attendees include:**

#### **Senior Administration Officials, Appointees and Members of Congress**

- **John P. Holdren**, Assistant to the President for Science and Technology and Director, Office of Science and Technology Policy (OSTP)
- **Valerie Jarrett**, Senior Advisor to the President, Assistant to the President for Public Engagement and Intergovernmental Affairs, and Chair of the White House Council on Women and Girls
- **Arne Duncan**, Secretary, U.S. Department of Education
- **Charles Bolden**, Administrator, National Aeronautics and Space Administration (NASA)
- **Francis Collins**, Director, National Institutes of Health (NIH)
- **Patrick Gallagher**, Director, National Institute of Standards and Technology (NIST)
- **Harold Varmus**, Director, National Cancer Institute (NCI)
- **Wendy Spencer**, Chief Executive Officer, Corporation for National and Community Service (CNCS))
- **Cora Marrett**, Director, National Science Foundation (NSF)
- **Stephanie O'Sullivan**, Principal Deputy Director, Office of the Director of National Intelligence (ODNI)
- **General Dennis Via**, Commander, U.S. Army Materiel Command

#### **Leading STEM and Media Communicators**

- **Dean Kamen**, Famed inventor and founder of DEKA research and FIRST
- **Kari Byron**, host of *Mythbusters* and *Head Rush*
- **Bill Nye**, *Bill Nye the Science Guy* and Executive Director, Planetary Society
- **Bobak Ferdowsi**, Flight Director, Mars Curiosity Rover (aka NASA's "Mohawk Guy")

### **A sampling of the exhibits that the President will see include:**

- **Teen Beats Rare Cancer, Then Hunts for Cure:** After surviving a bout with a rare liver cancer at age 12, **Elana Simon** of New York, NY, now 18, teamed up with one of the surgeons who treated her, set up shop in a medical lab, and began to collect much-needed data about the rare illness she'd endured. She gathered tissue samples from patients coping with the same cancer, fibrolamellar, performed genomic sequencing tests, and found a common genetic mutation across all of the samples she collected. Elana's results were published in the top journal *Science*, and formed a basis for a new website, the *Fibrolamellar Registry*, which she built to help empower fibrolamellar patients to share their own medical data for use by

researchers working to find a cure. Elana is a recent winner of the American Association for Cancer Research's Junior Champion in Cancer Research Award. She has presented her work before an audience of 16,000 cancer researchers and is headed to Harvard to study computer science in the fall.

- Fearless High-Schooler Doesn't Just Design Electric Cars, She Also Races Them: **Deidre Carillo**, 18, of San Antonio, TX knows what it's like to sit behind the wheel of an innovative electric vehicle she helped design and build, and to feel the adrenaline rush of racing it over a finish line. Diedre leads and helped found her high school's Southwest Engineering Team, which competes annually in Florida's Emerald Coast Electrathon—a national competition for student-built electric cars. For the first six months of the team's existence, Diedre was the only female member. As driver of the team's *Dragon 1* vehicle, she helped lead her team to second place finishes in the Electrathon for two years in a row, before grabbing a first place finish in the 2014 competition this year. After graduation, Diedre plans to study public relations at Texas A&M University.
- Student's "Sandless" Bag Keeps Salt Water off South-Florida Streets: **Peyton Robertson**, 12, of Fort Lauderdale, FL has seen firsthand the damages wrought by salt-water flooding in his own South Florida community—a problem that costs the region millions of dollars each year. Peyton built an innovative prototype "sandless" sandbag that can better protect flood zones, like his own community, against salt-water damage. His design is also lightweight, easy to store, and more effective at keeping water out than existing designs. Peyton was named America's Top Young Scientist at the 2013 Discovery Education 3M Young Scientist Challenge and received \$25,000 for his innovative design.
- Kid-Built Catapult Improves Basketball Shot Precision: Raytheon and the New England Patriots have partnered to create a science fair that encourages *Boys and Girls Club* members from across New England to explore the math and science behind the sports they love. For the Fair, the Hudson, Massachusetts-based "Catapult Court CEOs"—a team of 11 to 14-year-old students represented at the White House by **Brook Bohn**, 14, **Daisjaughn Bass**, 13, and **Gerry McManus**, 13 — engineered and built a custom-made catapult to determine whether they could improve basketball-shot performance. By shooting over and over again from an individual's optimal distance and angle from the hoop, the CEOs set out to prove that maximizing accuracy and precision when shooting baskets provides the highest level of performance on the basketball court. Their invention earned the team second prize at Raytheon's and the Patriots' 2013 Science of Sports Science Fair.
- Robotics Team from Chicago's Southside Outgrows Humble Beginnings in Mall Basement: **Lydia Wolfe**, 16, and **John Moore**, 19, are part of FIRST Robotics Team #1739, "The Chicago Knights" – an ambitious crew of 6<sup>th</sup> - 12<sup>th</sup> graders from across Chicago, IL, led by a dedicated mentor, Jackie Moore. Together, the team's mantra is: "The game is not the prize...it's the changes the game brings about in the kids". What started as a few people working on robots in the basement of the Ford City Mall is now a thriving team working at *Level Up* – a shared learning space that is open to any student interested in STEM-based after-school programs, summer camps, and "making." *Level Up* is...literally... a level up

from where this FIRST team started. They team moved upstairs to a bigger, brighter space in the Mall last year.

- 18-Year-Old Identifies Potentially Game-Changing Anti-Flu Medicine: After following news of the 2009 swine flu outbreaks, **Eric Chen**, 18, of San Diego, CA, decided there was something he could do to help. Eric took on a research project aimed at finding ways to protect people from dangerous influenza viruses such as H5N1 and H7N9, which pose a threats to populations around the world. As part of a microbiology project, Eric identified new drug candidates for the treatment of influenza—research that may lead to a new class of anti-flu medicines that could protect against a flu pandemic while new vaccines are being developed. Eric’s potentially game-changing work earned him the grand prizes at the 2013 Google Science Fair and Siemens Competition in Math, Science, and Technology, as well as places in the 2014 Intel Science Talent Search and 2013 Intel International Science and Engineering Fair.
- Football Fanatic Seeks Safer Helmet after “Aha” Moment: **Maria Hanes**, 19, of Santa Cruz, CA, dreams of becoming the first female collegiate head football coach—and she’s already built up some impressive credentials. Maria served as manager and film technician for the Desert Scorpions football team during her first three years of high school at Edwards Air Force Base, aiming to learn as much as possible about the game she loves. One afternoon, she dropped her cell phone, covered with a new rubber case, and noticed that the phone didn't break. She set out to test whether soft, impact-absorbing materials like the rubber case could be added to helmets to reduce concussion risk. Maria developed her "Concussion Cushion" science project, testing out several inner and outer cushioning materials for her players’ helmets—including gel and memory foam inserts and impact-absorbing outer coverings. Maria’s project earned her the Naval Science Award and place at the 2013 California State Science Fair.
- Girl-Powered Team Builds Search-and-Rescue Robot, Seeks Patent: **Olivia Van Amsterdam**, 16, **Katelyn Sweeney**, 17, and their team of student engineers from Natick, MA, invented a 120 lb remotely operated vehicle (ROV) that can help search-and-rescue dive teams search for bodies in dangerous, icy waters. Their submersible device works in waters up to 40 feet deep with temperatures of 33-45°F. With the help of their teacher and *pro bono* lawyers, the girls are currently working to file a U.S. patent application and hope to one day license their ROV technology. Their “InvenTeam” team presented its work at the 2013 Lemelson-MIT Program’s Eureka Fest celebration at the Massachusetts Institute of Technology (MIT). When not building ‘bots that can save lives, Olivia and Katelyn aim to be role models for other aspiring girl engineers—both volunteering as tutors and mentors. Katelyn will start as a freshman at MIT this fall. Olivia is excited to begin her college search.
- Girl-Coders Build App to Help Visually Impaired Classmate: Together, **Cassandra Baquero**, 13, **Caitlyn Gonzolez**, 12, and **Janessa Leija**, 11—part of an all-girl team of app-builders from Resaca Middle School in Los Fresnos, TX—designed an innovative solution to help one of their visually impaired classmates. The students built “*Hello Navi*” – an app that gives give verbal directions to help users navigate unfamiliar spaces based on measurements of a user's stride and digital building-blueprints. The service makes use of common digital

tools such as a compass and optical Braille readers and can be tailored for use in any building. The Girls' invention made them one of eight teams to win the recent Verizon Innovative App Challenge, and also earned their school a \$20,000 grant from the Verizon Foundation.

- Young Designers Help Pedestrians in Traffic-Jammed City: Noting the sobering statistic that Ethiopia has the highest rate of pedestrian deaths by vehicle in the world, **Felege Gebru**, 18, and **Karen Fan**, 17, of Newton, MA, designed a pedestrian alert system for use in Addis Ababa, Ethiopia, that alerts drivers to crossing pedestrians and helps pedestrians safely cross congested roads. The invention, designed to be powered by solar energy, uses a dual-sensor method to calculate the arrival time of oncoming vehicles and indicate safer crossing times to pedestrians. Felege and Karen are leaders of the Newton North High School "InvenTeam" – which works on prototype solutions to be showcased each June at the Lemelson-MIT Program's EurekaFest event. Both team members are naturalized U.S. citizens. Felege is a freshman studying Computer Science and Visual Arts at Brown University. Karen is a high-school senior and captain of her school's badminton team.
- Home-schooled Computer Wiz Builds STEM-Educational Game: **Nicolas Badila**, 15, a home-schooled student from Jonesboro, GA, created his own STEM-themed virtual world, *STEMville*, where students can pick a character, play challenging games, and improve their STEM skills. Nicolas spends much of his free time captaining a robotics team—the "*Steampunk Afros*"—with the *Hundred Black Men of Atlanta* initiative—an organization focused on community empowerment and supporting Atlanta's underprivileged youth. He also leads a computer science and robotics program within his homeschooling group. In the future, Nicolas hopes to work in robotics and open a center to teach kids computer languages, game development, and robotics. *STEMville* earned Nicolas the title of Middle School Open Platform Winner at the National STEM Video Game Challenge.
- Girl Scout Troop Designs Flood-Proof Bridge: **Avery Dodson**, 6, **Natalie Hurley**, 8, **Miriam Schaffer**, 8, **Claire Winton**, 8, and **Lucy Claire Sharp**, 8, members of Girl Scout Troop 2612 of Tulsa, OK, put their preparedness skills into action as part of the Junior FIRST Lego League's Disaster Blaster Challenge—which invites thousands of elementary-school-aged students from across the country to explore how simple machines, motorized parts, engineering, and math can help solve problems posed by natural disasters like floods or earthquakes. Recalling the recent, damaging summer floods in Estes Park, Colorado, the Troop noticed that first responders weren't able to easily reach certain communities because bridges had been washed out – and set out to design a solution. The girls invented the "Flood Proof Bridge," and built a model of their idea—not only mechanizing the bridge using motors and the correct gear ratios, but also developing, from scratch, a simple computer program to automatically retract the bridge when flood conditions are detected by a motion sensor embedded in the river bed. The girls are excited to keep brainstorming about new designs to help solve big challenges.

### **Additional exhibits at the White House Science Fair include:**

- Teen Makes Strong Magnet without Rare Materials: After reading a story in *National Geographic* about the global shortage of metals and elements used in magnets – called “rare earths” – and how important magnets are to objects like motors and wind turbines, **Kavita Selva**, 14, of Houston, TX set out to design a strong magnet that contains little or no rare materials. She used superconductor tape, a strip of metal tape coated with superconductor material to develop a strong magnet containing just a small amount of rare-earths. Kavita has already published some of her results with a professor at the University of Houston and earned a place as finalist in the 2013 Google Science Fair.
- Noting Neighbor in Need, Student Engineers Electronic "Seeing" Cane: After happening upon a visually impaired neighbor of hers walking in the street, **Katia Castañeda**, 19, of Oakland, CA, decided to harness her tech skills to help people like her neighbor stay safe. She developed an electronic cane that senses what is ahead of it using two sonar sensors and then warns its user about any potential obstacles. Katia is a student at the Lighthouse Community Charter School – an Oakland, California, public school serving low-income youth, which focuses on empowering students to design and “make.” After displaying her prototype at a Maker Faire, Katia received several offers to help her develop and manufacture the product.
- All-Girl Engineering Team Aims High with Purple Rocket: “Team Rocket Power” was one of 100 teams that qualified for last year’s Team America Rocketry Challenge (TARC). It was also one of just nine all-girl teams that qualified for the student rocketry competition and the only African American all-girl team. As proud members of Team Rocket Power from Maryland, **Rebecca Chapin-Ridgely**, 17, **Jasmyn Logan**, 15, and **Nia'mani Robinson**, 15, gave up their weekends and free time after school to build and test their bright purple rocket—which is designed to launch to an altitude of about 750 ft, and then return a “payload” (an egg) to the ground safely. The girls are looking forward to applying their rocketry expertise in diverse fields when they get to college – including medicine, journalism, and architecture.
- Overcoming Odds, North Dakota Kids Imagine City of the Future: Carrie’s Kids Inc., an all-volunteer ministry, helped **Joshua Troutman**, 13 and **Tanner Schantz**, 13, of Bismark, ND, harness their talents and skills to compete in the Future City Competition—which challenges students to imagine, design, and build sustainable cities of the future. Joshua, Isaac, and Tanner are at-risk for or experiencing homelessness, battling social disorders, or coping with difficult family situations. Their teacher, Carrie grosz, says these “extremely crafty and creative kids” overcame real anxieties and challenges by working together for countless hours after school and on weekends to engineer a hypothetical city with a sustainable transit system. The boys’ city, called “Whitewater Crossing,” employs an innovative, cost-efficient, climate-controlled, elevated monorail system. The design earned the team the Future City Students' Choice Award at the 2013-2014 Minnesota Regional Competition.
- Young Immigrant Launches Software Company with a Conscience: **Juan Ramos** moved to the United States from El Salvador two years ago, barely speaking a word of English. He quickly caught up and, with classmate **Amena Jamali**, both of Dallas, TX, launched *JJ New*

*World*, a company that creates software programs specializing in online games. The students' premier game, "*Better than History*" helps players think critically and view the world through a more informed lens as they navigate alternative endings to true historical events. Amena and Juan plan to use the income raised from their business to fund scholarships and poverty reduction programs in India and El Salvador, their families' countries of origin. Juan and Amena won 1st place at the Network for Teaching Entrepreneurship (NFTE) North Texas Regional Business Plan Challenge, and were Quarter-finalists in NFTE's National Youth Entrepreneurship Challenge.

- Kid Swimmer Designs Robot Squid: Competitive swimmer **Alex Spiride**, 14, of Plano, TX, loves water and loves science. Inspired by the quiet, powerful locomotion of squids and jellyfish, and after reading articles about cutting-edge research on soft, flexible robots, Alex design *Squid Jet* – a fast, efficient, and noise-limited underwater vehicle. *Squid-Jet* is a bio-inspired robot that uses the same kind of jet propulsion employed by sea creatures to get around. The device contains an inner bladder that squeezes and pushes out water to propel itself forward, outperforming current manmade propulsion systems and reaching speeds in excess of 30 cm/second. Alex hopes his invention can be used by marine biologists to study underwater ecosystems efficiently, while minimizing disturbances to creatures that usually come with the noise of a propeller. Alex is a finalist in the 2013 Google Science Fair.
- With Spare Parts from Physics Class, Students Develop Solar Scooter Charging System: **Kevin Barrios** and **Saul Soto**, both 18, developed a portable solar charging system to charge an electric scooter. The system is designed to be able to provide power in remote locations and to be quick and easy to setup. Kevin and Saul's project was initially focused on creating an electric go-cart, but their plans got derailed when the prototype go-cart was stolen. These young men didn't give up, using surplus and donated supplies from their community and shifting their focus to build and wire a scooter-charging station. Kevin and Saul completed their project as students at Lighthouse Community Charter School – an Oakland, California, public school serving low-income youth, which focuses on empowering students to design and "make." Their innovative design was showcased at the Maker Faire.
- Maryland Team Build Solar-Powered Hovercraft: **Ekeagwu Onyekachi**, 20, **Jevaughn Taylor**, 19, **Iragena Serge Bangamwabo**, 20, **Abhishek Yonghang-Subba**, 18, and **De'onte Green**, 19, a Baltimore, MD team harnessed the power of the sun to create a working mini "hovercraft" toy. The team's design—which includes three 6V motors, a 180-degree servo motor, and two 5v solar panels—started by developing a 3-D model, and built the physical prototype from recyclable, environmental friendly material. The resulting device, the Green Tech Solar Hovercraft, helped the team win first place at the Network for Teaching Entrepreneurship (NFTE) Baltimore STEM business Plan Competition. The students are studying a range of engineering- and computer-science-related subjects in high school and college, and one team member, De'onte Green, 19, will be entering the U.S. National Guard in June, after his high school graduation.
- Future Army Officer Seeks Healthy Lawns with Less Water: **Connor Klemenhausen**, 19, of Champlin Park, MN, was inspired to explore the science of "turfgrass" after a seventh-grade field trip to ecosystem-reserve. He then learned that turfgrass is the largest irrigated crop in

the United States – occupying more land area than corn, wheat, and soybeans combined. Connor’s ongoing research aims to find ways to reduce the amount of water needed to maintain healthy lawns, making more water available for drinking and agricultural demands. Connor is a self-proclaimed science-fair lover—having participated in various fairs since sixth grade. His research won the 2013 National Junior Science and Humanities Symposium, a competition sponsored by the Army, Navy, and Air Force. Connor is a freshman at the University of Minnesota and cadet in the Army ROTC program.

- Son of Two Physicians Seeks Brain Cancer Treatment: **Frederick Lang**, 18, of Houston, TX, has two parents who are physicians in a cancer center. Hearing stories of the difficulties their patients face drove him to pursue research that might help improve outcomes for cancer patients. Through his research, Frederick identified a potential new treatment for glioblastoma multiforme, the most malignant type of adult brain cancer, using human mesenchymal stem cells to secrete exosomes that contain anticancer microRNA – a project that earned him a \$10,000 scholarship from the Siemens Foundation. Frederick’s favorite subject is organic chemistry. He is a National Merit Scholar Semifinalist, captain of his school’s varsity soccer team, and is currently considering a profession in biomedical research or engineering.
- Nature Lover Finds Yet More Reasons to Appreciate Earthworms: **Anne Merrill**, 17, of Old Greenwich, CT, is inspired by nature – both scientifically and artistically. As a finalist in the Intel Science Talent Search 2014, Anne studied natural, non-chemical methods for suppressing soil-borne diseases. She looked at how “biochars”, a charcoal-like material created by burning organic waste to sequester carbon, can be integrated into topsoil by earthworms as they burrow and digest soil. Her results suggest that combining the natural methods of earthworm bioturbation with biochars in soil may help reduce carbon emissions, prevent the spread of plant-borne *E. coli*, and increase agricultural yields. Anne is president of her high school’s art club, has exhibited her nature-inspired art in several shows, and placed first in Princeton University’s Playwriting Competition.
- Young Scientist Models Galaxy Clusters, “Universe’s Most Massive Laboratories”: By simulating thousands of clusters of galaxies, **Henry Lin**, 18, of Shreveport, LA, has provided scientists with valuable new data, allowing them to better understand the mysteries of astrophysics: dark matter, dark energy and the balance of heating and cooling in the universe’s most massive objects. For his innovative work on galaxy clusters, Henry received one of two Intel Foundation Young Scientist Awards of \$50,000 at the Intel International Science and Engineering Fair in 2013. In 2012, Henry’s project on cosmic accelerated expansion won him a trip to tour CERN, among other awards. In 2013, Henry delivered a TED Youth Talk, calling galaxy clusters, “beautiful objects” that are “mysterious,” “surprising”, and “useful—as the universe’s most massive laboratories.”
- Georgia Duo Seek Smarter Route to Harness Sun’s Power: Noting that in the duration of just one hour, the Earth encounters more solar energy than the world population uses in a year, **Crystal Brockington** and **Aaron Barron**, both 18, of Conyers, GA, set out to harness the power of the sun more efficiently than ever before. The pair – self-dubbed as the “Nanocrystals” – conducted research to determine which alternative material could be used

in quantum dots – a key type of semi-conductor that makes solar cells work more efficiently – to create a more efficient, cost-effective solar cell that works without cadmium, a material traditionally that is detrimental to the environment. Their research project was built around a comprehensive study plan and project design component, including a cost analysis of different types of solar cells. The team’s work earned them the High School Grand Prize at the Seimens We Can Change the World Challenge.

- “Zero Waste” Team Finds Way to Un-Fill Landfills: **Aaron Kestaut, 13, Eric Long, 14, and Max Huhn, 13**, are members of the Hockessin, Delaware-based “Zero Waste” team—students focused on helping solve the challenge of Delaware's rapidly filling landfills. The Team learned that even with recycling measures in place, the state’s landfills are on track to be filled to capacity by 2030, and set out to solve the problem. Their research revealed that more than half of the waste placed in Delaware’s landfills can actually be composted. By implementing curbside organic composting collection and diverting organic waste away from the landfills, the team expects to extend the life expectancy of the state’s landfills and reduce the negative effects of landfills on the environment. The Zero Waste Team was awarded the \$25,000 Columbus Foundation Community Grant for their innovative project.
- Teens Build Bracelet to Self-Signal Autism-Related Behaviors in Kids: Three Culver City, California 15-year-olds, **Jonathan Berman, Maya Flannery, and Arjun Mahajian**, teamed up to study stereotypy – a behavioral issue involving repetitive or ritualistic movement that often manifests in children with autism. Recognizing that stereotypy can create social barriers and interfere with a student’s ability to focus and learn, the students set out to design a motion-detecting bracelet that could signal to a child through vibration that they were stereotyping, allowing the child to address the behavior in real time. The project—called Innovation in Autism—earned the team a place as finalist in the Google Science Fair and 1<sup>st</sup> Place at eCybermission, a free, web-based science, math, and technology competition for middle-school students that is sponsored by the U.S. Army.
- Alabama Innovator Engineers Prosthetic Leg from Bike Parts: Twenty-year old **Parker Owen** from Mobile, AL, designed a prosthetic leg made entirely of a single bicycle as a cost-effective solution to make prosthetics more accessible in developing countries. Parker was inspired after learning that a local mission trip to Honduras raises \$10,000 in donations each year, but that is only enough to buy components for four prosthetic legs. Parker designed the “Cycle-Leg” as a solution to significantly improve the quality of life of people in the developing world and made the. The Cycle-Leg is made entirely from the parts of a recycled bicycle, with the addition of three bolts, three nuts, and a few zip-ties. The leg has adjustable muscle fibers and tendons which are made from the bicycle's tire tubes, providing the resistance and force needed during strenuous activities. The synthetic muscles adjust with simple air pressure. The Cycle-Leg is adjustable to fit any size person and is designed to incorporate growth as well as muscle gain and loss over the course of a lifetime. Parker’s Cycle-leg won him the 2013 FIRST Future Innovators Award.
- Second Graders Design Warning System for Too-Hot Cars: **Ciara Newberry, 8, Elora Johnson, 8, and Swapneel Mandal, 7**, three second-grade students from John Ross Elementary School in Edmond, Oklahoma, put their heads together to help solve a problem



on the minds of many American parents: the threat of children overheating while sitting in too-hot cars. The students designed the “Hot Car Safety System”, which sounds an alarm when a car becomes too hot for people or animals. Weight sensors placed under the seats of the car ensure that the system turns on to protect all occupants. As part of entering their design into the National Science Teachers Association ExploraVision competition, the team build a website and submitted a video demonstrating the operation of their invention. The Hot Car Safety System earned Ciara, Elora, and Swapneel first place and a \$10,000 savings bond.

- Pittsburgh Teen Builds Patent-Worthy Prosthetic Limbs: Pittsburgh, PA, seventeen-year-old **Ananya Cleetus** has worked alongside a charity in New Delhi, India, to manufacture and patent a number of her inventions, including “Jaipur Foot” – an improved prosthetic leg. Her most recent project, a robotic prosthetic hand designed to aid leprosy victims in India, was computer modeled, 3D-printed, wired, sewed, and programmed entirely by Ananya. Her project has earned awards from Yale, Princeton, CMU, Duquesne, and the IEEE – and Ananya hopes her design will be released to the public soon. Ananya teaches a fully accredited robotics course at a middle school and was named a National Winner for Aspirations in Computing from the National Center for Women and Information Technology. She drums for her local Marching Band Drumline and hopes to one day double major in Electrical Engineering and Computer Science
- Michigan Robotics Crew Wins Big for Tech Skills and STEM Enthusiasm: **Courtney Hughes, 16**, and **Matthew Pasco, 17** represent a Clarkston, Michigan robotics team who competed fiercely on a national stage at this year’s FIRST Robotics Competition—which challenges teams of 25 students or more to build and program robots that perform prescribed tasks. The Michigan team was recognized not just for its robot-building prowess, but also serving as a model for other teams to emulate and best embodying the spirit of the FIRST competition. The team’s motto is to develop engaged leaders who inspire innovation and advocate for all young minds to be inspired in STEM. In addition to designing competitive robots, they lead outreach in their communities old to share their love of science, technology, and innovation with the young and old – including through summer engineering camps, organizing and executing a boat design competition and regatta, and bringing STEM to town parades.

In addition to those exhibiting, honored students invited to the White House Science Fair include:

- **Martin Carranza, 18**  
Phoenix, AZ  
FIRST Robotics
- **Quenan Ruiz, 17**  
Phoenix, AZ  
FIRST Robotics
- **Diserae Sanders, 17**

Phoenix, AZ  
FIRST Robotics

- **Roxanna Ayala, 17**  
Los Angeles, CA  
Esri; ConnectED
- **Dionte Dunbar, 16**  
Los Angeles, CA  
Coding with S.T.E.A.M. Competition
- **Jonathan Rodriguez, 16**  
Los Angeles, CA  
Coding with S.T.E.A.M. Competition
- **Thompson Whitely, 14**  
Fairfield, CT  
Rocket21
- **Yesenia Bonilla-Cardenas, 14**  
Denver, CO  
Girls, Inc.
- **Laura Herman, 18**  
Fort Lauderdale, FL  
DuPont Challenge Science Essay Competition
- **Robert Harris, 18**  
Chiacgo, IL  
Science Olympiad
- **Mary-Margaret Koch, 17**  
Elmhurt, IL  
Science Olympiad
- **Jonathan Bradway, 16**  
Indianapolis, IN  
DuPont Challenge Science Essay Competition
- **Austin Kraus, 18**  
Baldwin, KS  
Real World Design Challenge
- **Brenna Wallin, 13**  
Lexington, KY

Broadcom MASTERS

- **Alice Ren, 12**  
Andover, MA  
National Science Bowl
- **Allaprthi Snigdha, 13**  
Andover, MA  
National Science Bowl
- **Christine Hsieh, 15**  
Northborough, MA  
Zero Robotics
- **Sambangi Abhijeet, 13**  
Westborough, MA  
National Science Bowl
- **Alec Sun, 15**  
Lexington, MA  
Raytheon MATHCOUNTS
- **Chelsea Allen, 13**  
Sunburst, MT  
Samsung Solve for Tomorrow
- **Christian Bloch, 14**  
Sunburst, MT  
Samsung Solve for Tomorrow
- **Aelie Rowell, 14**  
Sunburst, MT  
Samsung Solve for Tomorrow
- **Treyton Pickering, 14**  
Sunburst, MT  
Samsung Solve for Tomorrow
- **Jeffrey Owens, 13**  
Sunburst, MT  
Samsung Solve for Tomorrow
- **Jonathan Butler, 17**  
Meridian, NH  
Real World Design Challenge

- **Phillip Kessler, 16**  
Meridian, NH  
Real World Design Challenge
- **Eric Swiler, 13**  
Albuquerque, NM  
DiscoverE Future City Competition
- **Elias Garcia, 11**  
Albuquerque, NM  
DiscoverE Future City Competition
- **Maggie Rosen-Filardo, 17**  
Montclair, NJ  
Zero Robotics
- **Jackson Welles, 16**  
Montclair, NJ  
Zero Robotics
- **Eddie Cuba, 11**  
Paterson, NJ  
Boys and Girls Club of America; Time Warner Cable's Connect a Million Minds
- **Jayda Collazo, 12**  
East Bronx, NY  
Boys and Girls Club of America; Time Warner Cable's Connect a Million Minds
- **Shannon O'Brien, 17**  
Bronx, NY  
Iridescent
- **Caroline Placzek, 21**  
Brooklyn, NY  
NY Hall of Science
- **Michelle Smith, 17**  
Bronx, NY  
Iridescent
- **Ashwin Sah, 14**  
Portland, OR  
Raytheon MATHCOUNTS
- **Zarin Ibnat Rahman, 17**  
Brookings, SD

Intel STS; Intel ISEF

- **Angie Martinez, 7**  
Houston, TX  
Girls, Inc.
- **Catherine Dempsey, 18**  
Arlington, VA  
Esri; ConnectEd
- **Celine Patrick, 16**  
Sumner, WA  
FFA Agriscience Fair
- **Ashley Tarro, 16**  
Federal Way, WA  
FFA Agriscience Fair

More details on some of the more than 40 competitions and organizations represented by students include:

- **American Association for Cancer Research**  
The [American Association for Cancer Research](#) (AACR) established the Young Champion in Cancer Research Award in 2013 to recognize an individual who has made an early contribution to cancer research and enhanced public understanding about the disease. The mission of the AACR is to prevent and cure cancer through research, education, communication, and collaboration.
- **Broadcom MASTERS**  
The [Broadcom MASTERS](#)® (Math, Applied Science, Technology and Engineering as Rising Stars), is a program of Society for Science & the Public, and is the premier U.S. and international middle school science and engineering fair competition. It provides an annual forum to spotlight the achievements of middle school students, their school and teachers, and offers a \$25,000 top award.
- **Christopher Columbus Awards**  
The [Christopher Columbus Awards](#) is a national, community-based science, technology, engineering and math (STEM) program for middle school students. The program challenges the students to work in teams of three to four, with an adult coach, to identify a problem in their community and apply the scientific method to create an innovative solution to that problem. The program is sponsored by the Christopher Columbus Fellowship Foundation.
- **Conrad Foundation Spirit of Innovation Challenge**  
The [Conrad Foundation's Spirit of Innovation Challenge](#) celebrates the life and

entrepreneurial spirit of astronaut Pete Conrad, third man to walk on the Moon. 13 - 18 year old students from around the world use STEM skills to develop business and technical plans for innovative products and services in one of four categories: Aerospace and Aviation, Cybertechnology and Security, Energy and Environment, and Health and Nutrition.

- **DiscoverE Future City Competition**

The [Future City Competition](#) is a national, project-based learning experience where students in 6th, 7th, and 8th grade imagine, design, and build cities of the future. Students work as a team with an educator and engineer mentor to plan cities using SimCity™ software; research and write solutions to an engineering problem; build tabletop scale models with recycled materials; and present their ideas before judges at Regional Competitions in January. Regional winners represent their region at the National Finals in Washington, DC in February.

- **Discovery 3M Young Scientist Challenge**

The [Discovery Education 3M Young Scientist Challenge](#) is the nation's premier science competition for students in grades 5-8. To help cultivate the nation's next generation of great thinkers and innovators and keep them interested in STEM-related issues, Discovery Education and 3M have teamed up to reward students for their science acumen and curiosity, while encouraging them to share that passion by creatively communicating their findings through this national competition. Ten national finalists participate in an exclusive summer mentorship with 3M scientists, and compete for \$25,000 and the title, America's Top Young Scientist. For more information please visit

- **DuPont Challenge Science Essay Competition**

[The DuPont Challenge Science Essay Competition](#) is North America's premier science writing competition for students grades 7 – 12. Students are asked to think critically about some of the world's greatest challenges and how they can be overcome through innovations in STEM (science, technology, engineering, and mathematics). The DuPont Challenge was created to honor the memory of the seven heroes of the 1986 Challenger Space Shuttle and all who work to encourage the next generation to explore the frontiers of science.

- **eCYBERMISSION**

[eCYBERMISSION](#) is a web-based, Science, Technology, Engineering and Mathematics (STEM) competition free for students in grades 6-9 that challenges students to think about real-world applications of STEM by working in teams to identify a problem in their community and using the scientific method, scientific inquiry, or engineering design process to find a solution. eCYBERMISSION is one of several science, technology, engineering and mathematics (STEM) initiatives offered by the Army Educational Outreach Program (AEOP). The U.S. Army is committed to answering the nation's need for increased national STEM literacy and expanding STEM education opportunities across the country to open doors to new career paths for America's students that lead to a brighter tomorrow.

- **Junior FIRST Lego League**

In this competition created by inventor Dean Kamen, FIRST (For Inspiration and Recognition of Science and Technology) LEGO League Teams (grades 4-8), build LEGO-based robots and develop research projects to develop valuable life skills and discover exciting career possibilities while learning that they can make a positive contribution to society. For children ages 6-9, [Junior FIRST® LEGO® League](#) (Jr.FLL®) captures young children's curiosity and directs it toward discovering the wonders of science and technology. This program features a real-world scientific concept to be explored through research, teamwork, construction, and imagination. Guided by adult Coaches, teams use LEGO® bricks to build a model that moves and develop a Show Me Poster to illustrate their journey.

- **FIRST Robotics Competition**

This international high school robotics competition run by [FIRST](#) (For Inspiration and Recognition of Science and Technology) has been dubbed by its creator Dean Kamen as a "varsity sport for the mind." It challenges teams of 25 students (grades 9-12) or more to raise funds, design a team "brand," hone teamwork skills, and build and program a robot to perform prescribed tasks against a field of competitors.

- **National FFA Agriscience Fair**

The [National FFA Agriscience Fair](#) is a competition for FFA members who are interested in the science and technology of agriculture. It is held each year during the National FFA Convention. The National FFA Organization is a national youth organization of 579,678 student members as part of 7,570 local FFA chapters in all 50 states, Puerto Rico and the Virgin Islands. The FFA Mission is to make a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education

- **Girls Inc.**

[Girls Inc.](#) inspires girls to be strong, smart, and bold through life-changing programs and experiences that help girls navigate gender, economic, and social barriers. Mentors equip girls to achieve academically; lead healthy lives; manage money; and discover an interest in science, technology, engineering, and math. The network of local Girls Inc. nonprofit organizations serves 125,000 girls ages 6 - 18 annually across the United States and Canada.

- **Girl Scouts of the USA**

[Girl Scouts of the USA](#) is the premier leadership organization for girls. Girl Scouts' approach to science, technology, engineering, and math (STEM) is unique because it's framed in leadership. Girls are able to gain quality STEM experiences through the Girl Scout Leadership Experience's three unique processes: girl-led, learning by doing, and cooperative learning. The girl-led environment is a safe, supportive place for girls to seek challenges in STEM fields that are often discouraged by unspoken assumptions about gender roles. By combining our girl-learning environment, our unique national program,

our unparalleled delivery infrastructure, and our proven expertise in working with partners, we offer powerful STEM learning experiences for girls across all sectors, including girls in traditionally underserved and underrepresented communities.

- **Google Science Fair**

[Google Science Fair](#) is an online science competition seeking curious minds between 13 and 18 years of age from the four corners of the globe. In the first year, over 10,000 students from over 91 countries participated, with three exceptional young women from the United States winning.

- **Intel Science Talent Search (Intel STS)**

The [Intel Science Talent Search](#) (Intel STS) is the nation's most prestigious science research competition for high school seniors, and provides more than \$1.2 million in awards each year. Seven decades since its launch, the program has recognized almost 3,000 finalists with more than \$12 million in scholarships. Alumni include holders of more than 100 of the world's most coveted science and math honors. These include four National Medals of Science winners, eleven MacArthur Foundation Fellows, two Fields Medalists and eight Nobel Laureates.

- **Intel International Science and Engineering Fair (Intel ISEF)**

The [Intel International Science and Engineering Fair](#) (Intel ISEF), the world's largest international pre-college science competition, provides an annual forum for approximately 1,700 high school students from more than 70 countries, regions, and territories to showcase their independent research as they compete for more than \$5 million annually. The Intel ISEF is the premier global science competition for students in grades 9–12.

- **Iridescent**

At [Iridescent](#) in the south Bronx, NY, high-school Explainers teach and mentor younger students while working on engineering projects of their own. Inspired by how human interaction can happen through nonverbal gestures, the Explainers built a computer-controlled model face from common household materials like cardboard, rubber bands, and plastic bags. By making low-cost high-sophistication engineering projects like this one, Iridescent's Explainers show that with a little persistence, curiosity, and courage, anybody can learn to be an engineer!

- **Junior Science and Humanities Symposium**

Jointly sponsored by the Military Services and administered through the Academy of Applied Sciences, the [Junior Science and Humanities Symposium](#) is a program that encourages students (grades 9-12) to do original research in STEM disciplines by competing for scholarships and recognition.

- **Lemelson-MIT InvenTeam**

The [Lemelson-MIT InvenTeam](#)<sup>TM</sup> initiative inspires young people to pursue creative lives and careers through invention. InvenTeams are granted up to \$10,000 each to conceptualize, design and build technological solutions to real-world problems. Working



prototypes of the solutions are showcased at the Massachusetts Institute of Technology each June at the Lemelson-MIT Program's EurekaFest event. The Natick High School InvenTeam and the Newton North High School InvenTeam have produced exemplary projects with sustaining efforts in their schools that will inspire many more youth to be inventive in years to come.

- **MakerEd**

The mission of the [Maker Education Initiative](#) (Maker Ed) is to create more opportunities for young people to make, and, by making, build confidence, foster creativity, and spark interest in science, technology, engineering, math, the arts—and learning as a whole.

- **MATHCOUNTS National Competition**

The [MATHCOUNTS Competition Series](#) is a national coaching, enrichment and competition program that challenges students with a talent and passion for math in multiple levels of competition. The 2013 Raytheon MATHCOUNTS National Competition brought together the nation's top 224 young mathematicians, who represented all 50 states and U.S. territories and schools worldwide through the U.S. Department of Defense and State Department.

- **National Center for Women & Information Technology (NCWIT)'s Aspirations in Computing**

[NCWIT's Aspirations in Computing](#) is the only nationwide recognition for young women in computing and information technology. NCWIT is a coalition of more than 300 prominent corporations, academic institutions, government agencies, and non-profits working to increase women's participation in technology and computing.

- **National Science Bowl**

DOE's [National Science Bowl](#) is a nationwide academic competition that tests students' knowledge in all areas of science. Competing teams of diverse backgrounds are quizzed on scientific topics in biology, chemistry, physics, astronomy, earth science, general science, and mathematics using a question-and-answer format similar to "Jeopardy."

- **National STEM Video Game Challenge**

Inspired by President Obama's Educate to Innovate initiative to promote a renewed focus on STEM education, the [National STEM Video Game Challenge](#) is a multi-year competition designed to create interest in STEM learning among America's youth by tapping into students' natural passion for playing and making video games.

- **Network for Teaching Entrepreneurship (NFTE)'s National Youth Entrepreneurship Challenge**

Network for Teaching Entrepreneurship (NFTE)'s [National Youth Entrepreneurship Challenge](#) is a business plan competition that helps young people unlock their potential for entrepreneurial activity. Since 1987, NFTE has reached more than 350,000 students and runs programs in 21 states.

- **Raytheon and New England Patriots "Science of Sports"**

In 2009, Raytheon Company and the New England Patriots Charitable Foundation teamed up to launch the “[Science of Sports](#)” program with Boys & Girls Clubs in New England. Each year, approximately 80 Raytheon volunteers mentor more than 150 students over 5 months to design and implement projects that explore the math and science embedded in competitive sports. The program culminates in the Science of Sports Science Fair at Gillette Stadium, where the 30 teams present their projects to New England Patriots owner Robert Kraft and Raytheon Chairman William H. Swanson, who award scholarships to the winning teams.

- **Real World Design Challenge**

The [Real World Design Challenge](#) is an annual competition that provides high school students, grades 9-12, the opportunity to work on real world engineering challenges in a team environment. Each year, student teams are asked to address a challenge that confronts our nation's leading industries. Students utilize professional engineering software to develop their solutions and generate presentations that convincingly demonstrate the value of their solutions.

- **Rocket21**

[Rocket21](#) is a Youth Innovation Platform that safely connects middle and high school students with opportunities, projects, events and innovation competitions involving world-class experts from the world's leading institutions and corporations. Rocket21's "Dream Green National Innovation Competition" invited youth to share their ideas for how to save the planet by reducing air pollution, keeping drinking water clean, making our oceans pure, conserving energy, or other high-impact solutions. The competition was presented in partnership with Captain Planet Foundation, an organization focused on empowering and inspiring the next generation of eco-visionaries and environmental stewards.

- **Samsung Solve for Tomorrow**

[Samsung Solve for Tomorrow](#) is a \$2 million grant program that promotes science, technology, engineering, and math (STEM) education among public school students in grades 6-12 where they are challenged to show how they can use STEM to address an issue in their community.

- **Science Olympiad**

[Science Olympiad](#) encourages teams of students in grades 6-12 to develop their interest in science and technology through competing in 23 events in the areas of chemistry, earth science, physics and technology.

- **Siemens We Can Change the World Challenge**

The [Siemens We Can Change the World Challenge](#) is the premier national sustainability challenge, empowering students in grades K-12 to develop and share environmental solutions that change the world. The Challenge is sponsored by the Siemens Foundation and is administered by Discovery Education to educate, empower and engage elementary, middle and high school students and teachers to become “Agents of Change” in improving their schools, communities and world. To date, over 4.6M students have

engaged with the Siemens We Can Change the World Challenge, increasing their STEM knowledge and creatively engaging their communities to find solutions to a local environmental issue or global energy challenge.

- **Siemens Competition in Math, Science and Technology**

The [Siemens Competition in Math, Science and Technology](#) is a premier science research competition for high school students. Administered by the College Board, the Competition is a program of the Siemens Foundation and was launched in 1998.

- **Team America Rocketry Challenge (TARC)**

The [Team America Rocketry Challenge](#) is the world's largest student rocket contest and the aerospace and defense industry's flagship program designed to encourage students to pursue study and careers in science, technology, engineering and math (STEM).

Sponsored by the Aerospace Industries Association, the National Association of Rocketry (NAR) and more than 20 industry partners, TARC provides middle and high school students the opportunity to design, build and launch model rockets in a competition among more than 5,000 students nationwide. The 2014 challenge tasked students with designing and building a rocket that could fly to 825 feet and back within 48 to 50 seconds while carrying precious cargo — two raw eggs that must return to the ground undamaged with the assistance of two parachutes.

- **Toshiba/NSTA ExploraVision**

Since its inception in 1992, the [Toshiba/NSTA ExploraVision](#) program has involved more than 287,000 students from across the United States and Canada. The competition encourages K-12 students to simulate real research and development as they study a technology of interest and predict and model what the technology might be like 20 years from now.

- **Verizon App Challenge**

The [Verizon Innovative App Challenge](#) provides the opportunity for middle school and high school students, working with a faculty advisor, to apply their STEM knowledge, ingenuity, and creativity to develop an original mobile app concept that incorporates STEM and addresses a need or problem in their school or community. The goal of the Challenge is to increase student interest and knowledge in STEM subjects and mobile technology through an engaging and empowering learning experience.

- **Zero Robotics**

[Zero Robotics](#) is a free robotics programming competition (grades 9-12) where the robots are SPHERES satellites inside the International Space Station (ISS). The competition starts online, on the Zero Robotics website, where teams compete to solve an annual challenge guided by mentors. Participants can create, edit, share, save, simulate and submit code, all from a web browser. After several phases of virtual competition, finalists are selected to compete in a live championship aboard the ISS. An astronaut conducts the championship competition in microgravity with a live broadcast!

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