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Spring 2017



Dr. Sanjaya
West Virginia
State University

Power plants

Dr. Sanjaya

West Virginia State University

Dr. Sanjaya from West Virginia State University (WVSU) is on a mission to revive West Virginia. Sound dramatic? Perhaps. But Sanjaya's plant biotechnology research could prove to do just that for the state's economy. He designs plants and microalgae with heightened nutritional value that can be grown essentially anywhere.

"I want to keep our talented, capable people home in West Virginia who feel forced to relocate, and we can do that with the jobs that this research will generate," said Sanjaya.

In his WVSU lab at the West Virginia Regional Technology Park, Sanjaya is using a gene-editing technique called CRISPR that gives him the ability to alter genes in plants which will enable them to grow on mountainous terrain, in soil with low nutrients and even under drought conditions. This research is considered cutting edge but has already proven to be viable in other parts of the world. For example, a lab in China has used it to create a fungus-resistant wheat, and other groups in China have used the technique on rice in an effort to increase yield.

Last summer, Sanjaya received a competitive \$300,000 grant from the National Science Foundation (NSF) to research seed storage compounds and bioenergy. His objective is to use the CRISPR technique to cultivate plants in his lab that will one day flourish on reclaimed surface mine lands in West Virginia – on soils that aren't currently suitable to grow much of anything. He takes that plan a step further and anticipates that former coal miners and other out-of-work West Virginians can be part of this new industry through job retraining.

Also, Sanjaya received grants from the U.S. Department of Energy (\$250,000) and Department of Defense (\$350,000) to develop photosynthetic organisms to remove toxic compounds from wastewater produced in the electric power generation process. This research could also have a lot of potential for West Virginia and the Appalachian region.

"We have challenges in West Virginia, but with great challenges come great opportunities," Sanjaya said. "With the right mindset, the right tools and the right support, we can do this."

The right mindset is something Sanjaya brought with him to the state three years ago after a mentor at Michigan State University gave him advice about being a change agent. Sanjaya said he hopes that his research will be the spark that ignites a brand new economy in West Virginia.

He has the support in place to make it happen. In addition to NSF funding and other federally funded grants, the WVSU administration recruited him specifically to originate and direct the university's Energy and Environmental Science Institute. Support for the creation of the institute and Sanjaya's position came from corporate partners such as AEP and the West Virginia Higher Education Policy Commission's Division of Science and Research in the form of a Research Trust Fund grant.

"When I left Michigan State, my friends asked me why I would choose to go to such a small school in West Virginia, but I love it here," Sanjaya said. "Everyone is very friendly and extremely supportive. Right now I'm building a team and creating collaborations among colleagues both at WVSU and in other states because I believe so much in what we are doing here."

Another avenue of Sanjaya's research is driven by the Appalachian Freshwater Initiative (AFI), part of West Virginia's current five-year NSF EPSCoR grant. AFI consists of a statewide research team of biologists, ecologists, environmental engineers and scientists, chemists and geologists who are all focused on understanding and detecting the ecological and biological effects of contaminants in water under varying climate change scenarios. As part of the team, Sanjaya is working to create a biosensor that can rapidly sense chemical change in water, and he's using green algae to do it.

He explained, "Chloroplasts are very sensitive to chemicals in water, so a photosynthetic plant like green algae can easily sense something like selenium, a common left-over chemical from the coal mining process, and sequester it out."

Sanjaya hopes the research will ultimately attract industry and academic partners to the region, enhancing economic development and workforce opportunities.

In addition to his ambitious research, Sanjaya is a leader in the classroom at WVSU who enjoys interacting with and motivating his students.

He said, "I often bring my students to the lab to do the real work they're learning about in the classroom. It's a different opportunity for learning because my research is very hands on."

Ever the visionary, Sanjaya not only hopes his research will motivate West Virginians to stay in the state, but he looks forward to the day that young people will flock to West Virginia to work in science and research.

He said, "If my research is even a small piece of the puzzle that helps West Virginia, then I am happy."

"Right now I'm building a team and creating collaborations among colleagues both at WVSU and in other states because I believe so much in what we are doing here."

Dr. Sanjaya



Dr. Sanjaya demonstrates a gene transfer technique using a gene gun to graduate student Tawna Heath. Their research goal is to generate a more nutrient-rich crop.

about West Virginia science and research

The Neuron is produced by the WV Higher Education Policy Commission's Division of Science and Research. The Division coordinates federal and state scientific research grants, including WVEPSCoR, to academic institutions in West Virginia and conducts outreach activities to broaden the public's understanding of science, technology, engineering and mathematics (STEM).

Visit www.wvresearch.org for more information.

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WVU assistant professor earns **NSF CAREER** award

Fernando Lima, assistant professor of chemical and biomedical engineering at West Virginia University (WVU), has earned a prestigious CAREER award from the National Science Foundation (NSF) for his work to improve modular systems for energy applications. The award comes with \$500,000 in funding over a five-year period.

The northeast and mid-Atlantic regions are home to an abundance of shale gas, which has the potential to be used as a low-cost feedstock for producing energy and chemicals. However much of it is “stranded.” The geographic terrain, especially in West Virginia, makes it difficult to build pipelines to extract the resource to process it in a centralized location. Modular systems, which are built from small pieces of equipment that can be easily transported to these sites, can eliminate the need for expensive pipelines.

According to Lima, there are several economic and technological challenges associated with modular systems that have prevented their development.

“One of the economic challenges is that the systems are small, thus challenging the concept of economies of scale,” Lima said. “Due to their size, they are coupled and highly integrated, which can result in mathematical models that are large in scale and complex and nonlinear in nature.”

Lima and the members of his research team, which include WVU students at both the graduate and undergraduate levels, will analyze computational approaches which are expected to provide guidelines for the design of modular systems in order to accelerate their development and use.

“This research will expose students to emerging technologies and state-of-the-art process systems engineering tools,” Lima said. “We will use process optimization and computational geometry tools to optimize and intensify designs for the modular systems so that they have maximized efficiency, reduced cost and minimized environmental impact. Additionally, statistical and stochastic control tools will be explored to account for process variables related to gas composition and energy cost.”

The investigated emerging technologies, Lima added, include membrane reactor processes for the direct methane aromatization conversion to hydrogen and benzene as well as natural gas combined cycle processes for power generation.

The project will utilize the process simulator at WVU’s Advanced Virtual Energy Simulation Training and Research, or AVESTAR, Center as a platform for the integration of research and education. Lima plans to host events for high school students to expose them to clean energy technologies through the use of the three-dimensional gaming environment of the process simulator.

“In addition to developing teaching skills for the WVU students, these events will hopefully motivate high school students to join STEM fields, thereby providing society a new workforce with the skills needed to succeed in a clean energy environment future,” Lima said. “This research is also closely aligned with current efforts by WVU’s Center for Innovation in Gas Research and Utilization as well as its Energy Institute.”

The NSF’s Faculty Early Career Development, or CAREER, program supports junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations. This is the seventh straight year that a member of the Statler College of Engineering faculty has been selected to receive this honor.



Fernando Lima said his NSF-funded research will expose students to emerging technologies and state-of-the-art engineering tools.

“This research is closely aligned with current efforts by WVU’s Center for Innovation in Gas Research and Utilization as well as the Energy Institute.”

Fernando Lima

GenCyber

Marshall selected to host 2017 GenCyber Summer Camp

Marshall University was selected by the National Security Agency and the National Science Foundation to host the first GenCyber Camp in the mid-Appalachian region for high school students interested in cybersecurity and careers in the cybersecurity workforce.

Joshua Brunty, assistant professor of digital forensics at Marshall, said the university is the first in West Virginia or Kentucky to receive funding for such a camp.

"This weeklong camp will be geared toward high school students in grades 9-12, and we hope to encourage our students in rural counties to apply and participate," Brunty said. "We have been tasked with creating opportunities for our underserved populations in the state, and this camp is a perfect example of how these opportunities can turn into real-life success stories for our youth."

Brunty, who will serve as program director for the camp, said the Marshall GenCyber Camp is free to all accepted students.

"All program costs, including all accommodations, meals, and activities, are covered through grants from the National Science Foundation and the National Security Agency."

The camp will take place June 25-30 on the university's Huntington campus.

WVU awarded \$1.25 million from ARPA-E for transformational energy technology

The United States Department of Energy (DOE) has marked an engineering research project at West Virginia University (WVU) as a high potential opportunity to make a demonstrable impact on the country's energy portfolio. WVU received \$1.25 million from DOE's Advanced Research Projects Agency-Energy (ARPA-E) which will be used to develop technologies for converting electrical energy from renewable resources into energy-dense carbon-neutral liquid fuels – that is, fuels that do not increase carbon dioxide in the atmosphere.

WVU received the award from ARPA-E's Renewable Energy to Fuels through Utilization of Energy-Dense Liquids, or REFUEL, program. John Hu, Statler Chair in the Statler College of Engineering and Mineral Resources and Hanjing Tian, assistant professor in the chemical and biomedical engineering department, will develop cutting-edge technology to synthesize ammonia from hydrogen and nitrogen using microwave plasma catalysis.

"The innovative ammonia synthesis technology developed in this project enables long-term energy storage and long-distance renewable energy delivery from remote, isolated and stranded locations," Hu said.

This award is a continued expansion of the efforts of WVU's Center for Innovation in Gas Research and Utilization and the WVU Energy Institute. It is the third award that has been granted to WVU by the highly-competitive ARPA-E program.



John Hu



Hanjing Tian

Marshall researchers receive **U.S. patent** to **treat one of world's major health issues**

Researchers at Marshall University have developed a method for treating sepsis, one of the world's major health problems, and other inflammatory disorders using cerium oxide nanoparticles (CeO₂ NPs.)

The researchers have been awarded a U.S. patent for the method and associated applications, which are now available for licensing through the Marshall University Technology Transfer Office.

Dr. Eric Blough, a professor at the school of pharmacy, said the novel method opens up new doors to treat sepsis and other disorders including alcoholic liver disease and the inflammation seen after trauma, severe burns or spinal injury.

"Sepsis is a serious complication caused by the body's overwhelming response to infection, which can lead to tissue damage, multi-organ failure and death," Blough said. "Current treatment strategies, which include the use of antibiotics, fluid resuscitation and additional support based on the symptoms, fail to address the needs of patients adequately. With the increase in antibiotic resistance and emergence of multidrug resistant pathogens, current treatment modalities are increasingly being challenged. Our method for treating sepsis using cerium oxide nanoparticles addresses this aptly without any potential concern for antibacterial resistance."

Dr. Nandini D.P.K. Manne, a researcher at Marshall's Center for Diagnostic Nanosystems and lead author on several of the publications generated from the research, said the dependence on nanomaterials in our day-to-day life for non-medical applications is increasing at a tremendous rate, but the biomedical application of these materials is still in its infancy.

"Our method shows that nanoparticles can be used to treat sepsis effectively," Manne said. "One major advantage is the lack of necessity for any refrigeration and long shelf life, which suggests that cerium oxide nanoparticles may be ideal for treating sepsis in resource-poor environments where proper medical and storage facilities are totally lacking. The biological applications of cerium oxide nanoparticles are enormous and could be used to address many unmet medical needs."

The treatment, researchers say, involves the nanoparticles being injected into a vein-after which they passively target liver Kupffer cells and exert the beneficial effects.

Cerium oxide is widely used as a polishing agent for glass mirrors, in sunscreens, ophthalmic lenses and in the automobile industry to increase fuel efficiency. Some studies have found that cerium oxide nanoparticles may also be capable of acting as antioxidants, leading researchers to investigate the potential biomedical applications of these nanoparticles.



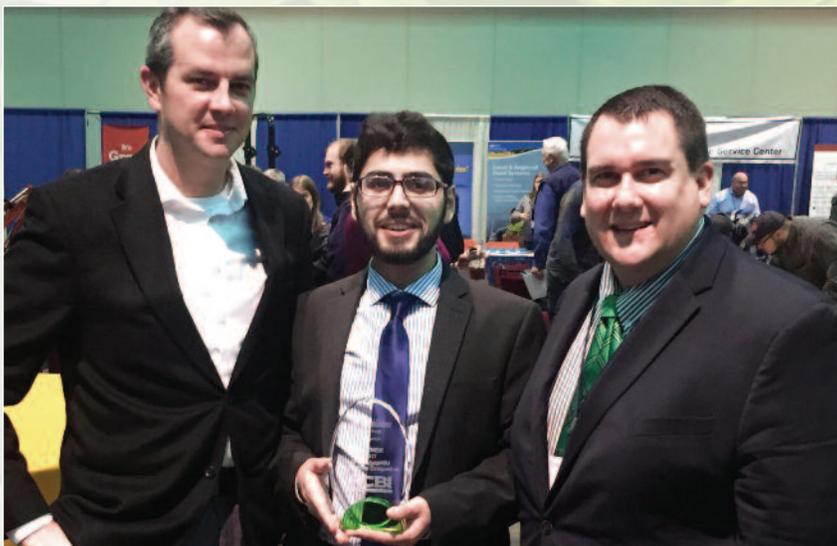
Eric Blough



Nandini D.P.K. Manne

"Our method shows that nanoparticles can be used to treat sepsis effectively."

Nandini D.P.K. Manne



WVU Tech student Nima ShahabShahmir (center) celebrates his win with Joseph Carlucci (l) from WV Hive and Bill Woodrum (r) from RCBI. Nima was the first student to work with WV Hive and the LaunchLab on WVU Tech's Beckley campus.

WVU Tech student lands more than \$10,000 in assistance for 'Future Fungi'

WVU Tech student Nima ShahabShahmir has big plans for a small business. In fact, the computer science major hopes he will change the way consumers think about eco-friendly products. His project is called Future Fungi, and it aims to disrupt the plastic and Styrofoam industry by turning mycelium – the basic structure and roots of a common mushroom – into eco-friendly consumer items like plates, cups and blocks.

The process works by forming the mycelium into various products that are baked, glazed and sold in bulk to environmentally-conscious purchasers. The fungi-based product is waterproof, lightweight and boasts an indefinite shelf life. It's also a biodegradable alternative to long-lasting plastics, which ShahabShahmir says can sit for 400 years before being degraded. By comparison, a Future Fungi cup will return to nature in as little as two weeks. Mycelium is also rich in nutrients, which gives a Future Fungi product a usable life well after it is discarded.

"It will have great positive impacts for the state of West Virginia," said ShahabShahmir. "We are planning on using the agricultural waste materials from the farms within the state and also the process of natural decomposition of these materials can bring lots of nutrients to the soil, which will ultimately help out the agricultural businesses."

In recent weeks, he has secured the support of multiple organizations that will help him bring Future Fungi to fruition.

ShahabShahmir won the New River Gorge Regional Development Authority's Common Grounds competition sponsored by TechConnect. The \$500 competition award allowed him to conduct additional research and experimentation. After his research showed the vast potential for the product, he participated in the Robert C. Byrd Institute's Vanguard Agricultural Competition, where he received an award of \$10,000 and a year of business assistance. That assistance will help him put together everything from patent applications to Future Fungi logos.

ShahabShahmir said that it's still too early to know the exact timeline of Future Fungi's rollout because he's still experimenting with the mycelium-based products, but that he hopes to share more news in the coming months.

"There are lots of applications for utilizing these eco-friendly products and by the assistance of the Robert C. Byrd Institute I will be able to bring these innovative ideas into reality," he said.



Sierra Hoffman and Amaris Jalil collect core samples from trees in Virginia's Shenandoah National Park.

Shepherd student communicates tree research

Shepherd University student Sierra Hoffman recently had the opportunity to present the results of her research at the annual meeting of the U.S. Regional Association of the International Association for Landscape Ecology (US-IALE). Hoffman, a senior biology major, is working with Dr. Mark Lesser, assistant professor of biology, and Amaris Jalil, a sophomore biology major, on a study to determine how climate change affects trees in the Shenandoah National Park in Virginia.

"I feel it's a great honor and it's prestigious because I know a lot of people don't have this opportunity to present their findings to such a large conference," Hoffman said.

Lesser's research looks at why plants, particularly trees, grow where they do.

"One of the things that I'm just generally interested in is how trees respond to fine-scale differences in climate and topography," Lesser said. "I am interested in how those trees are going to grow in that location in the future based on climate change, or how they're going to have to move on the landscape in the future to stay within their climatic niche space."

Lesser, Hoffman and Jalil collected core samples from 120 red oak trees at 24 different locations that spanned the full elevational range of the park. Hoffman and Jalil sanded and cataloged the samples, and measured the tree rings back to 1965.

Hoffman received an undergraduate research fellowship from the NASA West Virginia Space Grant Consortium, which allowed her to work with Lesser last summer and attend the US-IALE meeting. Jalil received a Shepherd Opportunities to Attract Research Students (SOARS) grant, which is funded by the West Virginia Research Challenge Fund, to help with the research.



WVU Tech students and faculty celebrate National Engineers Week with STEAM

National Engineers Week was in February, and dozens of WVU Tech students celebrated throughout the state.

On Saturday, February 25, more than 40 students and faculty attended Discover Engineering at the Center for the Arts and Sciences of West Virginia. The annual event draws in young people and set an attendance record of more than 1,100 this year.

Volunteers from the Association for Women Engineers, Scientists, Or Mathematicians showed kids how to create bracelets and keychains with their names spelled out in binary code. The group also used marshmallow Peeps to demonstrate what happens in the vacuum of space without a spacesuit.

The biology program brought their famous hissing cockroaches plus an electrocardiogram (EKG) machine to show how the electrical impulses of the heart are monitored. The WVU Tech Association for Computing Machinery brought along arcade games and a robot that visitors could pilot with a balance board. Chemical engineering students worked on chromatography while students from electrical engineering shocked visitors with their electromagnetism and static demonstrations. The student chapter of the Society of Automotive Engineers displayed their Baja racing vehicle and the Aero Design team students helped attendees create paper airplanes.

An hour east in Beckley, seven WVU Tech faculty members served as guest judges for a science fair hosted at Woodrow Wilson High School. They also connected with local teachers about potential for in-class demonstrations during the school year. Earlier in the week, WVU Tech representatives also visited Holz Elementary School in Charleston for a day of coding.

Stephany Coffman-Wolph, assistant professor of computer science and information systems at WVU Tech, said the events are all part of the university's efforts to spread learning beyond campus.

"I think it's very important that we reach out to the community to expose them to the STEM fields. I think it's great to let kids know that these fields are out there and that they can do it – and that this is the kind of fun stuff we get to do every day at our jobs," she said.

Photos: WVU Tech students inspire children in engineering concepts.

Marshall's Brain Expo gives children glimpse into the nervous system



More than 700 elementary school children from West Virginia and Kentucky visited Marshall University's Memorial Student Center on March 31 to learn about the brain and nervous system through activities and games. It is supported by the National Science Foundation, Marshall's College of Science and the Department of Biological Sciences.

Dr. Nadja Spitzer, assistant professor of biology and an organizer for the event, said this is the ninth annual Brain Expo to be held at Marshall.

"The event features 27 interactive stations where children explore various parts of their nervous system. They also learn how the brain controls their body and why healthy lifestyle choices lead to better brain health.

Activities at the stations include learning to juggle, playing a memory game, coloring their own 'brain hat,' testing their reflexes and building brain cell-shaped key chains," Spitzer said.



Approximately 200 Marshall students and faculty from the College of Science, the Department of Psychology and the schools of medicine and pharmacy managed the activities. St. Mary's Medical Center presented a station about brain and spinal cord safety, Marshall Health Neuroscience discussed nervous system injuries and disease and the West Virginia Alzheimer's Association organized a trivia game.

Spitzer said the event was part of Brain Awareness Week, an annual global effort founded in 1996 by the Dana Alliance for Brain Initiatives. The Brain Expo at Marshall was founded by Spitzer and Dr. Brian Antonsen, both of whom are neuroscientists and faculty in Marshall's Department of Biological Sciences.

"Events like the Brain Expo are an excellent way of increasing public awareness of brain research at Marshall and in gaining the interest of students who may choose a career path in science, technology, engineering or mathematics," Spitzer said. "Through the many fun hands-on activities, attendees get to better understand the brain. Our goal for the Brain Expo is to interest children in science and research at a young age through games and activities that demonstrate the relevance of neuroscience in everyday life."

For more information about the Brain Expo and Marshall's Brain Awareness Program, visit www.marshall.edu/baw.

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Photos: Children learn more about how their brains work and how neuroscience is part of everyday life.

Marshall School of Medicine dedicates new simulation laboratory

The Marshall University Joan C. Edwards School of Medicine's Department of Surgery recently unveiled a new simulation laboratory (sim lab), a tool that provides surgical and procedure learning opportunities for surgical residents and, in turn, will enhance quality and safety outcomes for patients. The sim lab was dedicated to Department Chair Dr. David Denning, who has served the medical school for 25 years.

"The role of simulation is vitally important in medical training and education," said Dr. Joseph I. Shapiro, dean of the school of medicine. "These progressive technologies allow for surgical residents to experience multiple situations in an environment that mimics a host of surgical suite scenarios."

Dr. Farid Mozaffari, residency program director, said both the GI MENTOR™ and the BRONCH MENTOR™, simulate various training opportunities with true-to-life patient cases.

"Both of these simulators offer a number of modules that residents can use to learn about clinical situations, from the simple to the complex," Mozaffari said. "We are grateful for Dr. Denning, whose leadership at Marshall Surgery has been outstanding over the years. He recognized the importance of a sim lab to our residency program and worked with our hospital partner, Cabell Huntington Hospital, and others to make it happen."

Denning, a board-certified surgeon with a subspecialty certification in surgical critical care, graduated from the West Virginia University School of Medicine and completed a residency at Ohio State University. He began his surgical career in Huntington in 1982.

"It takes a team effort to train the surgeons of tomorrow, and I'm very grateful to our partners for their support," Denning said. "The goal of the simulation training is to ensure that patient safety is of paramount importance. These trainers assist the users in recognizing pathology as well as providing them an opportunity to perfect their skills before patient interaction."

"The role of simulation is vitally important in medical training and education. These progressive technologies allow for surgical residents to experience multiple situations in an environment that mimics a host of surgical suite scenarios."

Dr. Joseph I. Shapiro



Victor Fragoso

WVU's Fragoso to study **computer vision-related image recognition**

Self-driving cars use images from on-board cameras to navigate through cities. But what happens when the car's computer can't recognize the same image in two different pictures? Victor Fragoso, an assistant professor in the Lane Department of Computer Science and Electrical Engineering at West Virginia University, said a computer's inability to identify the same object in two different pictures is a fundamental problem in the field of computer vision.

"Humans have the ability to recognize the same object in different images, which allows them to understand and navigate through the three-dimensional structure of the world. This same task, however, does not come so easily to computers," Fragoso said. "Computers need to understand a scene through an image, which is represented as a squared grid of numbers."

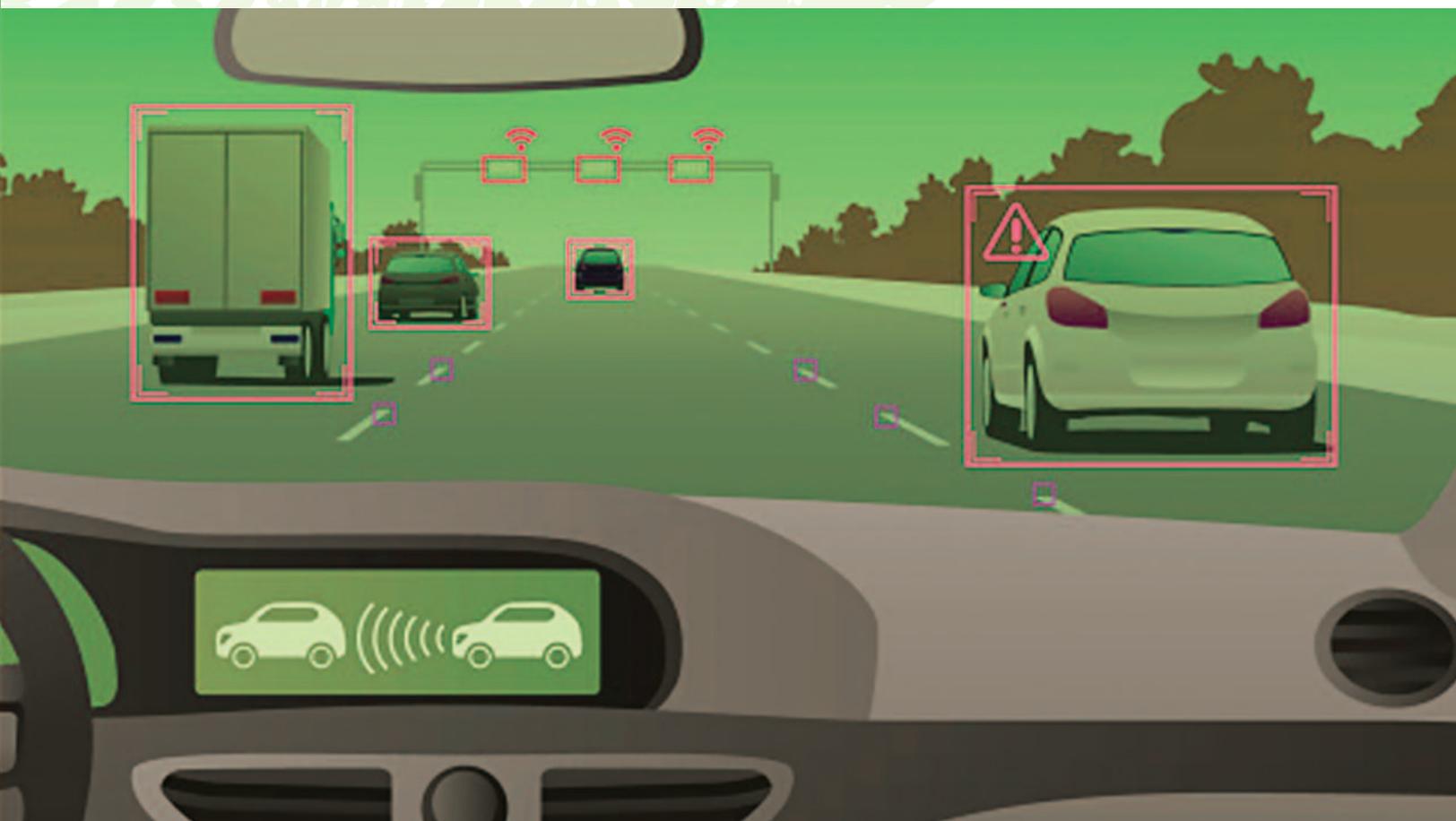
Fragoso's research, which is being funded by a two-year grant from the National Science Foundation, will measure the confidence the computer has when it determines that two objects with different viewpoints are present in one same scene.

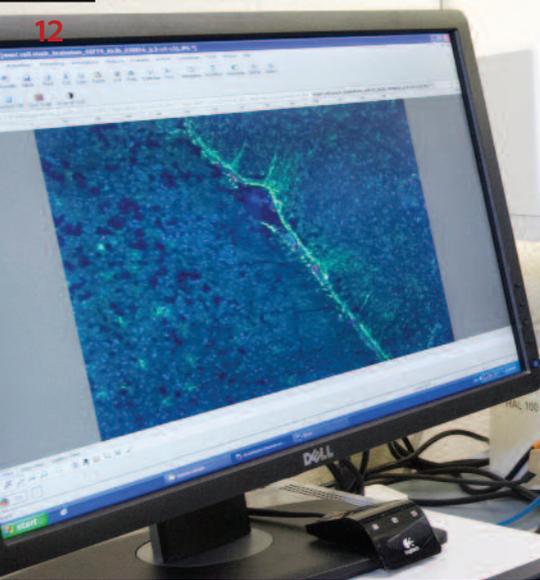
"A self-driving car uses images from its cameras, among other data from various sensors, to localize where it is in a city. These cars recognize objects in the street and associate them with their respective 3D models," Fragoso explained. "When this recognition process goes wrong, the car will estimate a wrong location and could even cause an accident."

Fragoso will investigate ways in which the computer can reason about the different objects it detects and its confidence in accurately recognizing those objects. The proposed confidence measures can alert about wrong identifications and can help the car trigger other mechanisms to avoid localization errors on-the-fly.

"Many systems perform slowly when the computer produces wrong object identifications in a pair of images," Fragoso said. "The applications have to identify the incorrect object identification somehow, remove them and then use the correct identifications to operate."

Fragoso will investigate different ways to speed up computations in several applications in image stitching, panorama creation, augmented reality and self-driving cars, among others. Additionally, the project will investigate ways to compress 3D models while still ensuring a good functionality in many vision-based, navigation autonomous systems.





Joyce Morris-Wiman

WVSOM associate professor uses **neuroscience research** to determine treatments for **pain management**

Dr. Joyce Morris-Wiman has a talent for research. She was involved in neuroscience research at the University of Florida for 23 years, but she missed teaching. Her desire to interact with students both in the classroom and in the laboratory was an important factor in coming to the West Virginia School of Osteopathic Medicine (WVSOM) in the summer of 2012.

The most significant focus of Morris-Wiman's research since working at WVSOM has been the study of muscle repair and changes in the central nervous system as they correlate to pain management, specifically in the jaw muscle.

"The jaw muscle doesn't heal well and many people suffer from chronic jaw pain," Morris-Wiman explained. "Of course, there is good pain. Good pain causes us to react and change patterns that are causing the pain to then support the healing process. When the muscle is healed or repaired, then the pain goes away."

Chronic pain, however, continues after the muscle is no longer damaged. While studying the central nervous system, Morris-Wiman and her students can monitor how the system reacts to pain points and damaged muscles.

One indicator, as a result of the findings conducted by her students, is that females have a different pain pathway than males. Ultimately this different pathway translates to the theory that opioids are not as effective as a pain management option in females.

Morris-Wiman said, "The more we know about pain pathways the better we can treat chronic pain."

The researchers have also determined that females have a higher tolerance to prolonged pain than males, but males most often tolerate acute pain at a higher level than females. This information can be helpful to medical students when they enter their practices so they may determine the best and most direct pain management protocol to follow, Morris-Wiman added.

This research has been partially funded by a National Institutes of Health grant of \$275,000.

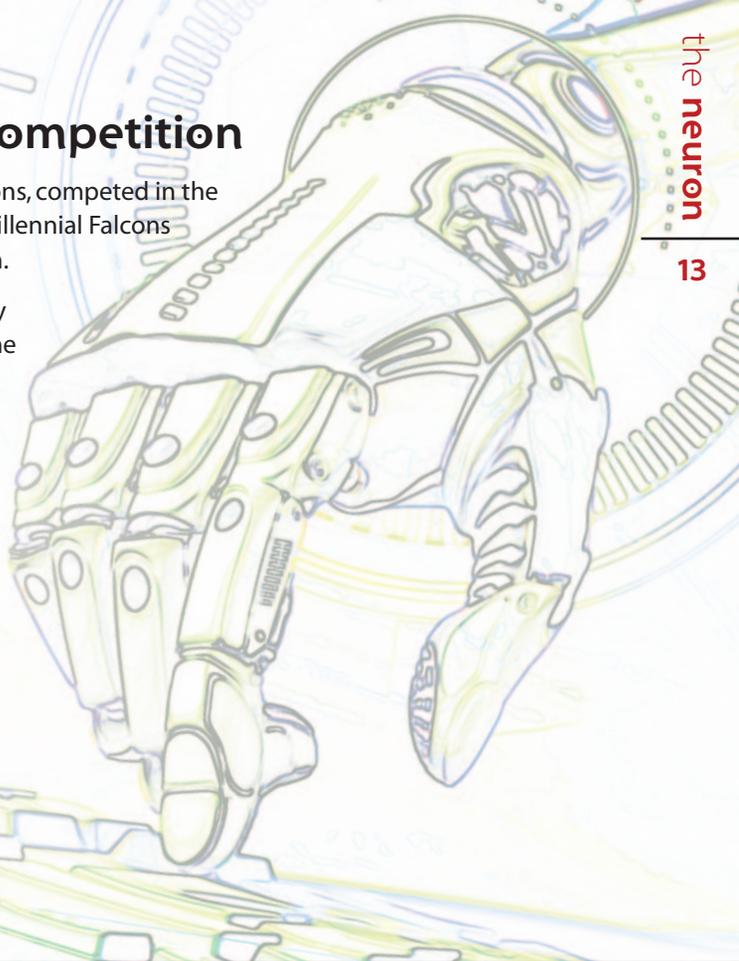
FSU students participate in **robotics competition**

Fairmont State University's (FSU) VEX Robotics team, the Millennial Falcons, competed in the Catskills VEX U Robotics Competition at SUNY Sullivan on Feb. 18. The Millennial Falcons are a rookie VEX U team, and this was their first tournament competition.

VEX U is the college-level portion of VEX Robotics, which is sponsored by the Robotics Education & Competition (REC) Foundation. At the event the Millennial Falcons competed with New Jersey Institute of Technology, NY Institute of Technology (NYIT), Rutgers University, Old Dominion and the host team, SUNY Sullivan. The Falcons won in their quarter final rounds and advanced to the semi-finals, where they were defeated by the tournament champions, NYIT.

However, the Millennial Falcons won the Judges Award at the competition, which goes to a team that the judges determine is deserving of special recognition. According to the REC Foundation website: "Judges consider a number of possible criteria for this award, such as team displays of special attributes, exemplary effort and perseverance at the event and team accomplishments or endeavors throughout the season that may not fall under existing awards, but are nonetheless deserving of special recognition."

The Millennial Falcons are led by FSU Mathematics Support Coordinator Beth Thompson.



WVU's **alternative fuels program** joins efforts with **Earth Day Texas**

The National Alternative Fuels Training Consortium (NAFTC), a program of West Virginia University, joined forces with the world's largest Earth Day initiative, Earth Day Texas, to conduct the 2017 Kickoff Event for National Alternative Fuel Vehicle Day Odyssey. Earth Day Texas hosted the kickoff as part of an inaugural one-day alternative fuel vehicle summit, coordinated by the NAFTC.

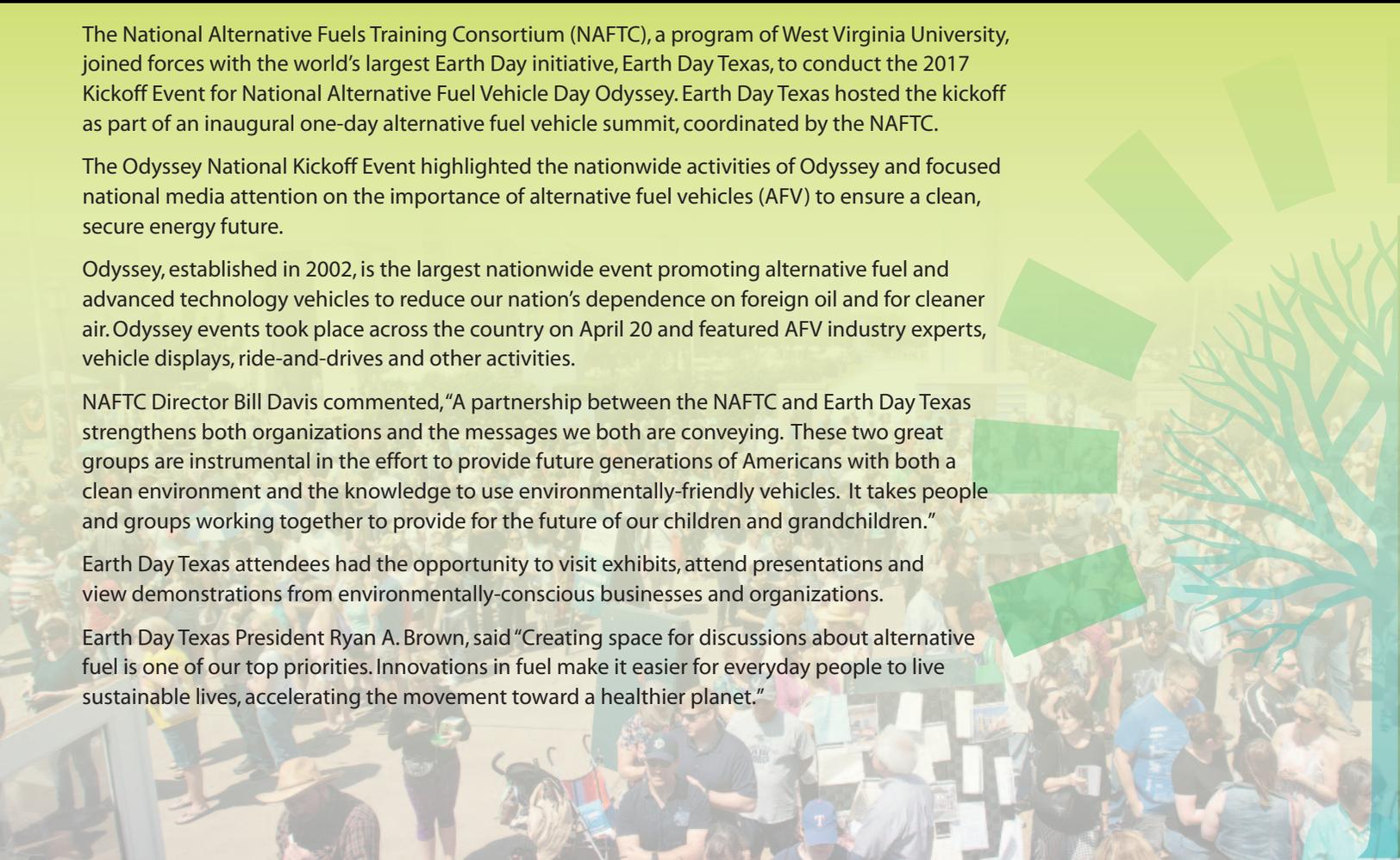
The Odyssey National Kickoff Event highlighted the nationwide activities of Odyssey and focused national media attention on the importance of alternative fuel vehicles (AFV) to ensure a clean, secure energy future.

Odyssey, established in 2002, is the largest nationwide event promoting alternative fuel and advanced technology vehicles to reduce our nation's dependence on foreign oil and for cleaner air. Odyssey events took place across the country on April 20 and featured AFV industry experts, vehicle displays, ride-and-drives and other activities.

NAFTC Director Bill Davis commented, "A partnership between the NAFTC and Earth Day Texas strengthens both organizations and the messages we both are conveying. These two great groups are instrumental in the effort to provide future generations of Americans with both a clean environment and the knowledge to use environmentally-friendly vehicles. It takes people and groups working together to provide for the future of our children and grandchildren."

Earth Day Texas attendees had the opportunity to visit exhibits, attend presentations and view demonstrations from environmentally-conscious businesses and organizations.

Earth Day Texas President Ryan A. Brown, said "Creating space for discussions about alternative fuel is one of our top priorities. Innovations in fuel make it easier for everyday people to live sustainable lives, accelerating the movement toward a healthier planet."



WVU announces Faculty Fellows in Engineering

Two assistant professors at West Virginia University (WVU) have been named the inaugural J. Wayne and Kathy Richards Faculty Fellows in Engineering.

Thorsten Wuest, from the Department of Industrial and Management Systems Engineering, and Saiph Savage, from the Lane Department of Computer Science and Electrical Engineering, were appointed to the three-year positions, which provides funds to support and grow their respective research programs.

The fellowships are the result of a \$1 million gift made in 2014 by alumnus J. Wayne Richards and his wife, Kathy. The first-of-its-kind endowment at WVU provides flexible funds to allow WVU to hire, retain, reward and recognize faculty members who have not yet achieved tenure.

"In a short period of time, Thorsten and Saiph have made significant contributions to the future of the Statler College and West Virginia University," said Gene Cilento, Glen H. Hiner Dean of the Statler College. "Thorsten has advanced the College's research work in smart manufacturing, while Saiph has achieved international notoriety in the field of social engineering. I believe they epitomize the types of leaders Wayne and Kathy envisioned as being Richards Faculty Fellows in Engineering."



Thorsten Wuest



Saiph Savage

Shepherd to offer new Bachelor of Science Degree in engineering science

Starting in the fall of 2017, Shepherd University will begin offering a Bachelor of Science in engineering science with concentrations in environmental engineering and systems engineering.

Reza Mirdamadi, chair of the Department of Computer Science, Mathematics, and Engineering, said typically degrees in engineering focus on specific topics, like mechanical, chemical and nuclear.

"Today, the differences between various fields in engineering are blurred, with all these topics coming together," Mirdamadi said. "You might graduate as a mechanical engineer and you may end up doing other things that are not in the field of mechanical engineering because employers are looking for graduates who have the ability to learn and enough technical background that they can learn on their own."

Mirdamadi said Shepherd's engineering students will be exposed to applied mathematics, applied science, computer science and engineering courses in an effort to make them well-rounded and able to tackle whatever problems arise in industry."



Science, Technology, Engineering Math

A path in STEM

Marshall University President **Jerome A. Gilbert**

Dr. Jerome A. Gilbert's path to becoming President of Marshall University commenced in a STEM field – biological engineering to be exact. In March, he was named a 2017 Distinguished Fellow in the Bagley College of Engineering at his alma mater of Mississippi State University.

The prestigious Distinguished Fellows program celebrates the accomplishments of Bagley College alumni and reconnects the honorees with the school and its engineering heritage. Gilbert, who graduated from Mississippi State in 1977 with a Bachelor's Degree in biological engineering, said he was humbled by the recognition.

"To be acknowledged among respected colleagues by my alma mater is special," said Gilbert. "My experiences in undergraduate research at Mississippi State were instrumental in my going on to graduate school and an eventual career in higher education. A number of my mentors, as well as colleagues I have long admired, are Distinguished Fellows, so this was a true honor."

After graduating from Mississippi State, Gilbert went on to earn a doctorate in biomedical engineering from Duke University. His research has been in orthopedic biomechanics, cellular mechanics, biomaterials, bone remodeling and osteoporosis, and was supported by the National Institutes of Health, the National Science Foundation, the U.S. Department of Agriculture and various other public and private sources.

Gilbert began his academic career in 1982 at North Carolina State University where he served as a visiting assistant professor of mechanical engineering. In 1983, he accepted a position as an assistant professor of orthopedic surgery at the University of North Carolina at Chapel Hill (UNC). While at UNC, he established the biomechanics research laboratory and also was a member of the faculty of biomedical engineering.

In 1988, he accepted a faculty position at Mississippi State and attained the rank of professor five years later. For 10 years, he was a research affiliate with the Institute of Neurocognitive Science and Technology at Mississippi State, and was among the first class of Mississippi State's honors faculty in the Shackouls Honors College. From 1989-2005, he also served as clinical assistant professor of orthopaedic surgery (research) for the University of Mississippi Medical Center.

At Mississippi State, he served as head of the Department of Agricultural and Biological Engineering and coordinator for the biomedical engineering graduate program in the Bagley College. While he was the department head, he helped establish the school's undergraduate concentration and the master's and doctoral programs in biomedical engineering.

Gilbert went on to be Mississippi State's associate provost and associate vice president for academic affairs, before being promoted to provost and executive vice president in 2010.

He was named president of Marshall University in October 2015 and assumed the office in January 2016.

He is a former national president of the Institute of Biological Engineering and is a member of numerous other professional societies. He is a Fellow in the American Institute for Medical and Biological Engineering and the Institute of Biological Engineering.

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FROM THE DIRECTOR: Students springing forward

Each year when spring rolls around, we see evidence of students getting out and doing great things. This year is no exception. A few examples are in this issue: a WVU Tech student is on the brink of a new business that could revolutionize the disposable tableware industry not to mention help reduce the waste in our landfills, and a Shepherd student has presented her tree research, which has climate change implications, at a national conference.

In addition, there are two stories specific to college students reaching out to children which we always love to see. One was a multitude of events in celebration of National Engineers Week and the other is an annual event where children flood Marshall's campus to learn all about their brains.

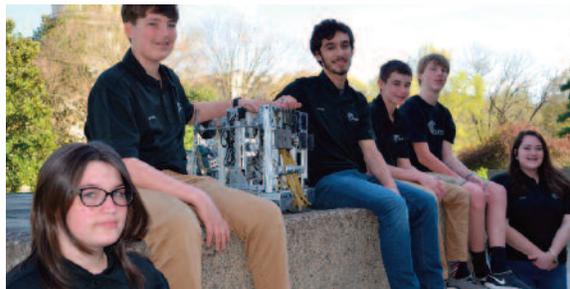
With spring also comes brand new opportunities on the horizon. It could be an undergraduate student from a small town in West Virginia getting her first opportunity to be in a lab for a summer research experience funded by our Research Challenge Fund. Or, it could be a middle school student learning about forensic science in a summer camp on WVU's campus. Whatever the case may be, we hope any student from any part of West Virginia can see and discover a new love for the STEM fields.

The group of high school students below is from Monroe County. They're a brand new rookie FIRST robotics team that defeated all odds and went to St. Louis in April to represent West Virginia at the FIRST Robotics Tech Challenge World Championship. I would wager that they are so successful because they simply put their minds to learning about robotics and made it happen. I hope you're as inspired by these few examples of students as I am. They give me hope that our collective future is bright.

Jan R. Taylor

Jan R. Taylor, Ph.D.

Director of Science and Research
West Virginia Higher Education Policy Commission



L-R: Maddie Mohler, Cade McMunigal, Morgan Holzman,
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