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Fall 2012

Here's looking
at you

Jeremy Dawson
West Virginia University

West Virginia Higher Education Policy Commission



WVPEPSCOR



WVU'S JEREMY DAWSON: Here's looking at you

Jeremy Dawson is watching you. He sees your facial structure, your irises, your gait and your movements. He records those traits and recognizes them later.

Well actually, Jeremy Dawson himself is not watching you, but the research assistant professor in the Lane Department of Computer Science and Electrical Engineering at West Virginia University and principal investigator for research at CITeR,

the Center for Identification Technology Research, is studying how to use sensory devices and computer hardware and software to identify people.

In addition to physical appearances, he is researching ways to identify the 'molecular signature' that each individual exudes, from their DNA to the unique bacterial colonies they host.

Dr. Dawson is among a team of researchers from WVU and other organizations probing deeply into the study of biometrics, the science of establishing human identity based on traits such as fingerprints, facial structure, iris and voice. Beyond studies in these conventional biometrics, he and his team are beginning to investigate the emerging field of molecular biometrics.

He hopes his research will enable rapid analysis of DNA samples that may be smaller or of lower quality than current technology allows, while providing accurate results in the field within minutes instead of the hours or days needed to complete the analysis in a lab today. His research team also is investigating the possibility of using the human bacterial fingerprint as a means of identification.

He leads studies funded by the U.S. Department of Justice and CITeR, whose projects are selected by a collection of affiliates, including government agencies and technical companies such as Lockheed Martin.

With successful research by Dr. Dawson of conventional and emerging biometric methods and the technologies they use, there may come a day when:

- U.S. soldiers at a remote combat outpost will be able to tell, day or night, whether a fast-approaching vehicle carries allies or enemies,
- law-abiding travelers can pass quickly and hassle-free through border crossings into the United States, while persons with a known criminal past are prevented access,
- individuals can be identified and certain diseases can be detected within seconds simply by analyzing a person's scent.

Continued next page

"Rapid access to the whole human genome raises a bunch of societal questions relating to personal privacy. Yet, the benefits of developing biometrics based on molecular signatures are great, as are the expected secondary benefits of applying these methods, such as better public health."

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Dr. Dawson acknowledges that the technology he is helping develop at WVU's Benjamin M. Statler College of Engineering & Mineral Resources will allow for an extraordinary amount of information about individuals to be available almost instantly.

Growing up in West Virginia's Eastern Panhandle, Jeremy Dawson didn't envision his future as a cutting-edge researcher. "I always liked taking things apart and putting them back together."

He is still taking things apart, but now at the molecular level, and he's figuring out how to put it all together in a way that will make society safer.

Learn more at www.citer.wvu.edu.

Like fingerprints, irises are unique to each individual and time invariant, making them good for biometric system identification



The Dawson file:

Graduate of Keyser High School
Mineral County, W.Va.

Bachelor's, Masters and Doctorate degrees
in Electrical Engineering, WVU

Five years as researcher with WV High Technology
Consortium Foundation

Returned to WVU as faculty member in 2007.

Capture 1

Right Eye

Left Eye

about the division of science and research

The West Virginia Higher Education Policy Commission's Division of Science and Research directs the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR) in West Virginia. The division also coordinates scientific research grants to academic institutions and conducts outreach activities to broaden the public's understanding of science, technology, engineering and mathematics (STEM) disciplines. For more information, visit www.wvresearch.org.

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MU professor named Outstanding Civil Engineering Educator of the Year

A Marshall University professor is the first recipient of the Outstanding Civil Engineering Educator of the Year Award established by the West Virginia Section of the American Society of Civil Engineers (WVASCE).

Dr. Richard McCormick, a professor of engineering in the College of Information Technology and Engineering (CITE), received the award at the WVASCE's 2012 annual meeting.

"He is certainly among those civil engineering professors who have shaped the industry and the economy of this region," said Dr. Wael Zatar, CITE dean.

Prior to coming to Marshall, McCormick spent many years at West Virginia University Institute of Technology, where he served as a faculty member, department chair, interim executive vice president and vice president for academic affairs.

Dr. William Pierson, professor and chair of the Weisberg Division of Engineering and Computer Science, said one indication of McCormick's teaching effectiveness is the performance of MU engineering students on the Fundamentals of Engineering (FE) exam. "Our average passing rate on the FE exam has been above 83 percent, which is above the national average of about 75 percent over the same time period," Pierson said. "This success is, in my opinion, due in large part to the quality of the educational experience provided by Dr. McCormick in key foundation courses."

Exploration and learning the lessons at

Fairmont State Sci-Tech Open House

Fairmont State University's College of Science and Technology welcomed 572 students from 15 high schools to its 5th annual Engineering and Science Challenge.

Students spent four hours on the campus, choosing from among 19 hands-on design challenges to excite them about the possibilities for future learning in science, technology, engineering, and mathematics.

"The students learned a lot about what engineering is like," said Elvira Stanescu, science teacher at Morgantown High. "They enjoyed the somewhat unstructured environment, which allowed them to explore more."

Activities offered included rocket motor testing, build your own robotic arm, a rescue mission within a confined space lab, creating a mechanical part using AutoCAD and a three-dimensional printer, extracting chlorophyll from plants, *Whodunit* (a forensic science investigation), and many more. The event exposed the students to real-life challenges and college level laboratories, and time with college students and faculty.

Next year's FSU Engineering and Science Challenge will be September 20, 2013.

Learn more at www.fairmontstate.edu.





Celebrating a great past while building for a fantastic future was the theme of the day when West Virginia University's Benjamin M. Statler College of Engineering and Mineral Resources broke ground in September for the Advanced Engineering Research Building.

The new facility, expected to be finished in 2014, will be a hub of research and education. The groundbreaking event came as the Statler College celebrates 125 years of engineering education throughout the 2012-2013 academic year.

"It is well known that many great ideas become reality when talented people of different backgrounds have a place where they can collaborate and exchange thoughts," said Gene Cilento, dean of the Statler College. "We want this new building to help serve that purpose on this campus for technological advances."

The new engineering building will house offices, classrooms, computer classrooms, a learning center, and graduate student space as well as a clean room to meet the needs of high-technology learning and discovery. Dean Cilento noted the price tag of \$42 million is a bit higher than that for the University's first dedicated building for engineering studies, Machinery Hall, built in 1892 with \$5,000 in state funds plus \$12,000 for "apparatus and machinery" from the Morrill Fund.

"This building will bring new energy to the whole engineering college, and it will have a transformational impact on faculty and students," said Cerasela Zoica Dinu, assistant professor of chemical engineering. "It will allow us to recruit more dedicated scientists to our programs and to promote collaborations with other colleges on campus and with researchers across the country."

Watch 125 years of Engineering at WVU at www.statler.ev.u.edu/125.php



WVU breaks ground on **new Engineering** building while **celebrating past**

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Cerasela Zoica Dinu,
assistant professor of chemical engineering.

Statler College celebrates 125 years of engineering education

WVCTSI combines NIH and other awards to enhance patient care

With a \$19.6 million National Institutes of Health research grant, plus an additional investment of \$33.5 million from WVU and statewide partners, the West Virginia Clinical and Translational Science Institute (WVCTSI) at West Virginia University will begin \$53.1 million in studies with the ultimate goal of enhancing patient care.

"This NIH grant serves to instantly propel WVU Health Sciences onto a higher level as a research institution," said Christopher C. Colenda, M.D., M.P.H., chancellor for WVU Health Sciences. "I consider this one of the greatest accomplishments to have occurred in the history of WVU Health Sciences. It will help us to transform lives and eliminate the health disparities in the state."

Addressing health disparities is the primary mission of the WVCTSI. The funding will allow the Institute to recruit physician scientists as well as support existing researchers to advance health care. It will expedite research by moving findings from bench to bedside, effectively changing patient care and the way physicians practice medicine.

WVCTSI is a statewide partnership of leading health care and educational institutions. It supports research focusing on health problems most commonly affecting Appalachians, such as cancer, cardiovascular-stroke and obesity-related diseases.

The clinician scientist leading this effort is principal investigator and WVCTSI director, Uma Sundaram, M.D.

"At the WVU Health Sciences Center as well as at many other centers, there is excellent research and excellent patient care; however, patient-centered research which advances health care is not as strong," Dr. Sundaram said. "WVCTSI will become that strong connection. What that means for the patient is a new approach and new options for diagnosis, treatment, and prevention."

This grant is part of an NIH Institutional Development Award Program for Clinical and Translational Research (IDeA-CTR) and will help build necessary infrastructure allowing scientists to become more competitive for other research funding opportunities over the next five years.



Dr. Nader G. Abraham named vice dean for research at MU School of Medicine

An internationally recognized researcher in the field of obesity and vascular disease is the inaugural vice dean for research at the Marshall University Joan C. Edwards School of Medicine.

Nader G. Abraham, Ph.D., Dr. H.C., FAHA, brings with him a team of six researchers. Abraham was chairman and professor of physiology and pharmacology at the University of Toledo College of Medicine. He is also affiliated with New York Medical College in Valhalla, N.Y., The Rockefeller University in New York and University of Catania in Italy.

"Dr. Abraham brings to Marshall University and the Joan C. Edwards School of Medicine exceptional experience and a proven track record in advancing successful grant-funded research," said MU President Dr. Stephen J. Kopp. "Put simply, he is a research catalyst. He most certainly will complement our efforts to expand applied research activities that yield commercially viable discoveries."

"Dr. Abraham is one of the preeminent biomedical researchers in the world, and his joining our faculty raises our profile immediately," said Joseph I. Shapiro, M.D., dean of the medical school.

Widely recognized for his research on vascular disease, which is a prelude to cardiovascular and metabolic diseases including hypertension, stroke, diabetes and obesity, Abraham and his team of researchers specifically study heme oxygenase, the most potent antioxidant gene in the human body. The team's research also includes ways to speed up the implementation of laboratory findings into clinical therapeutic strategies for patients, i.e., translational medicine.

Read more about Dr. Abraham at www.musom.marshall.edu.



Who knows what knowledge the first Statler Scholars will uncover?

Seven students have the honor of being named the first-ever **Benjamin M. Statler Scholars** in **Engineering** and **Mineral Resources** at West Virginia University. The six undergraduates and one graduate student will receive scholarship and research support from funding that was part of the historic \$34 million gift made by Ben Statler and his wife, Jo, earlier this year.

Petroleum and natural gas engineering major Zachary Cesa will analyze the production performance of multiple fractured horizontal wells in the Marcellus shale to determine long-term production performance.

Chemical engineering major Anna McClung will focus on energy-related technologies through research involving direct carbon fuel cells.

Civil and environmental engineering major Ye Tao of China is hoping to produce a new type of concrete, incorporating the use of sticky rice, resulting in a material that is more energy conservative and environmentally friendly.

Chemical Engineering doctoral student Matthew Thompson's research centers on the polymer industry, one of the largest industries worldwide and one with a big presence in West Virginia, aimed at improving the impact strength of polymers.

Three freshmen--Jessica Griffith, Andrew Maloney, and Ryan Gellner--have been named Statler Undergraduate Scholars. All of the students were selected based upon the quality of their proposed research projects.

Zachary Cesa

Anna McClung

Ye Tao

Matthew Thompson

Jessica Griffith

Andrew Maloney

Ryan Gellner

Aither Chemicals identifies market demand for ethane

MATRIC spinoff Aither Chemicals recently conducted a month-long “open season” to determine the demand for products that could be made by an ethane cracker located in West Virginia. Bayer Material Science agreed to help Aither solicit interest from potential customers, ethane suppliers, and vendors.

Aither CEO Leonard Dolhert said the market response showed strong interest in products that can be made using Aither’s catalytic ethane cracking technology.

Aither has identified five anticipated products to be used in a variety of downstream products like plastic and antifreeze.

MATRIC demonstrates innovation for students and educators

Besides its mission as a market-driven innovator in chemical, energy and environmental technologies, the Mid-Atlantic Technology, Research & Innovation Center at the West Virginia Regional Technology Park has found itself to be frequent tour host of late.

MATRIC hosted more than 100 students from the National Youth Science Camp, welcomed representatives of the Charleston Area Alliance’s Educator-Industry Institute, and met officials from West Virginia University’s Eberly College of Arts and Sciences.

“MATRIC’s willingness to introduce visiting students to its research activities and accomplishments is commendable. The tour is a fitting start to the NYSC program, which encourages its participants to pursue education and careers in STEM fields,” said Andrew Blackwood, executive director of the National Youth Science Foundation.

MATRIC is an independent, nonprofit corporation whose experienced team of world-class scientists partner with higher education, industry and government to conduct market-driven research and development and to commercialize resulting products and services.

“The E-ll program provides educators further insight into local industries and associated jobs. Our visit helped educators see innovation in action. They gained a better understanding of how MATRIC combines ideas and research to commercialize products.”

Cullen Naumoff | Charleston Area Alliance

Grant to support mine safety research at Marshall University

The Center for Environmental, Geotechnical and Applied Sciences (CEGAS) at Marshall University is receiving \$96,306 from the U.S. Department of Labor’s Mine Safety and Health Administration to support mine safety research.

Researchers at CEGAS will use the grant funds over the next year to develop a computer program to perform mine ventilation network planning calculations. The program will simulate a mine’s ventilation system and its response to altered conditions, including external influences such as temperatures and internal influences such as mine fires.

The CEGAS researchers plan to incorporate the program into a virtual mine safety training academy to produce realistic mine emergency response exercises.

“This program, which we call VFIRE, will be a unique educational and training tool,” said CEGAS Director Dr. Tony Szwilski, principal investigator. “Using the Internet, students and trainees will be able to log into a virtual underground mine from anywhere. They will be able to perform realistic mine emergency response exercises in collaboration with other participants, while interacting with a simulated ventilation system. We are confident VFIRE will be an innovative product that will have numerous applications including mine safety and training.”

The grant was awarded through the Brookwood-Sago program, which provides education and training within the mining industry. The funding is used to develop and implement training and related materials for mine emergency preparedness, as well as for the prevention of accidents in underground mines.

Learn more at www.marshall.edu/cegas.

BSC faculty published in scientific journal

Bluefield State College faculty members Dr. Tesfaye Belay and Dr. Anthony Woart were published in the July 2012 issue of the *Journal of Microbiology, Immunology, and Infection*.

Dr. Belay, an associate professor of Biology, and Dr. Woart, professor and director of the Minority Health Institute, collaborated on a scientific study of chlamydia infection.

"Data obtained in the study may aid in understanding the infection mechanisms and give insights to control or prevent the spread of chlamydia infection in humans by developing a vaccine," Dr. Belay stated.

To date, Dr. Belay has authored and co-authored 25 scientific articles published in peer-reviewed international journals. The research is supported by the National Institutes of Health through a partnership with the West Virginia-IDEA Network of Biomedical Research Excellence (WV-INBRE).

West Liberty University professor studies use of strong bacteria as vaccine host

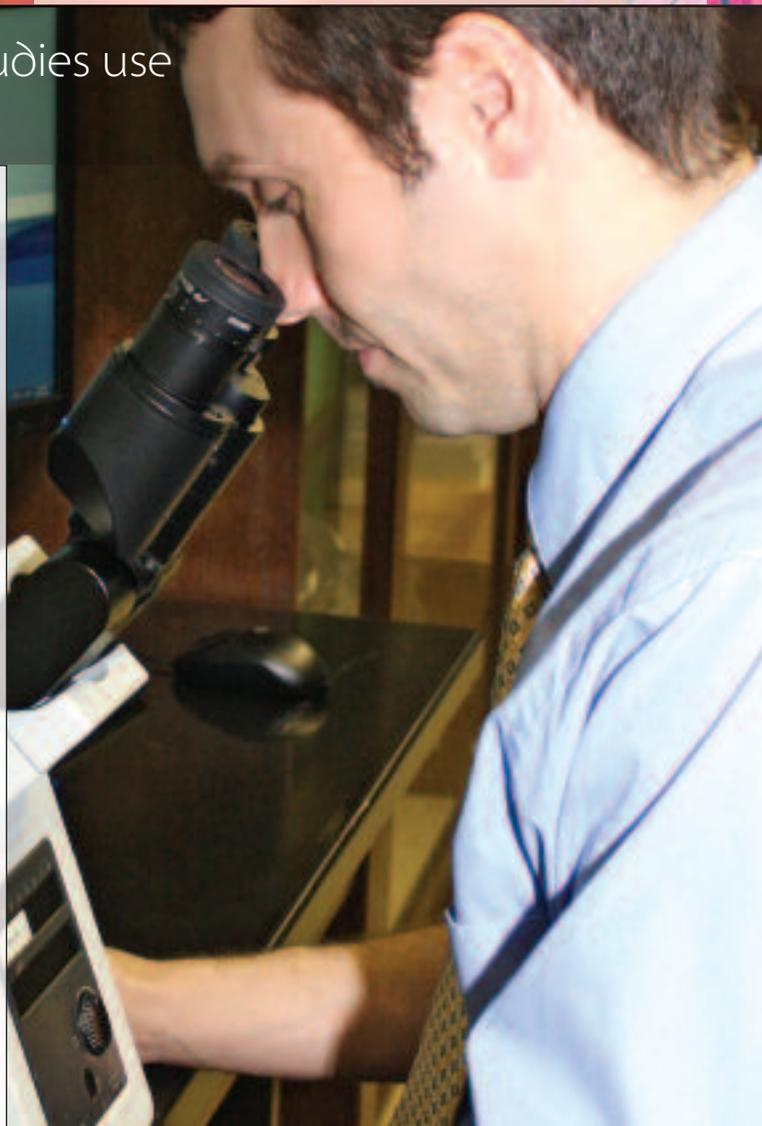
A West Liberty University biology professor has received half a million dollars in grants to continue his studies on a unique bacterium as a vaccine host.

Dr. Joseph Horzempa received \$250,000 from the National Institutes of Health and an additional \$250,000 from the West Virginia INBRE (Idea Network of Biomedical Research Excellence) program.

The red blood cell-invading bacterium, *Francisella tularensis*, is highly infectious. Fewer than 10 inhaled bacteria can cause the fatal disease tularemia. The Centers for Disease Control and Prevention has classified it as a biodefense agent because of its possible use in bioterrorism. Besides the threat of intentional release, it causes a variety of naturally occurring human infections that can be acquired by inhalation, insect bites, exposure or contact.

In the two, two-year grants, Dr. Horzempa is studying a modified version of the bacterium, weakened to the point it is not dangerous, as a way to deliver live vaccines. "Patients immunized with this organism show a very long-term memory response -- over 30 years post vaccination," he said. "Based on the fact that this is such a potent vaccine, we propose to use this organism as a novel vaccine platform," he explained.

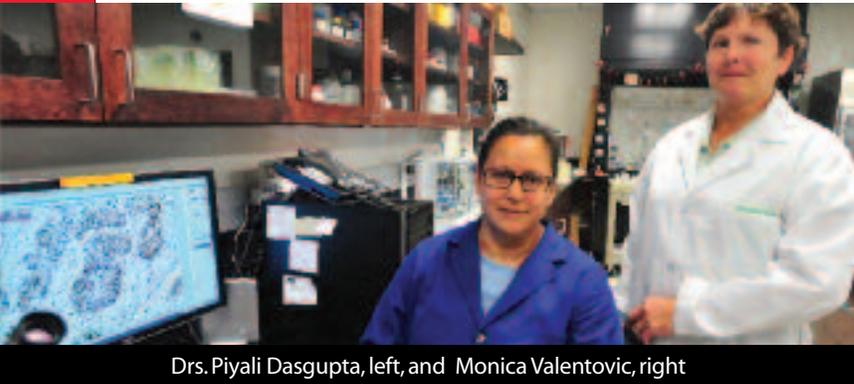
Horzempa first began to work on the bacterium at the University of Pittsburgh, where he was employed prior to joining West Liberty in 2011.



Marshall scientist awarded NIH grant for lung cancer research

A three-year, \$426,000 grant will allow a Marshall University faculty member to further her lung cancer research.

Dr. Piyali Dasgupta, associate professor in the Department of Pharmacology, Physiology and Toxicology in the university's Joan C. Edwards School of Medicine, will use the grant to continue her work to determine if the nutritional agent capsaicin—the active ingredient in chili peppers—can improve the anti-cancer activity of the commonly used chemotherapy drug cisplatin in patients with small cell lung cancer.



Drs. Piyali Dasgupta, left, and Monica Valentovic, right

Dasgupta received the funding through the National Cancer Institute's Academic Research Enhancement Award program. The program supports research projects in the biomedical and behavioral sciences that strengthen the research environment of the institution and expose students to research. Her co-investigator is Dr. Monica Valentovic.

"Small cell lung cancer is characterized by a high rate of growth, early metastasis and a dismal survival rate," said Dasgupta. "Although chemotherapy works well initially in these patients, they often relapse quickly and become unresponsive to chemotherapy. Since the preliminary data in our laboratory shows that capsaicin manifests

anti-cancer activity in this type of cancer, we are hopeful our studies under this new grant may lead to new treatments."

Dasgupta also acknowledged the support of the chairman of her department, Dr. Gary Rankin, and Dr. Marcia Harrison and the MU-ADVANCE program, which she says made it possible for undergraduate students to work in her lab. MU-ADVANCE is a National Science Foundation-funded program to help increase the number of female science and engineering faculty at the university.

Learn more at www.musom.marshall.edu.

WVU economic development initiative LIINCs researchers with private sector

A West Virginia University initiative focused on strengthening ties between university researchers and the private sector is making inroads in creating a new innovation and entrepreneurial culture in the state.

WVU's Linking Innovation, Industry and Commercialization (LIINC) program, which works to improve the economic impact of WVU's research by creating close ties with the private sector, is also gaining national recognition.

LIINC won first place in the University Economic Development Association 2012 Award of Excellence program, considered to be the leading awards program for colleges and universities engaged in economic development.

Manager Lindsay Emery says LIINC is increasing opportunities for research funding, licensing, development partnerships, patent activity and future job prospects for students and graduates.

"LIINC hosted a series of dinners and receptions that brought together some of WVU's most innovative student and faculty researchers to meet informally with private industry representatives," Emery said. "Each event highlighted a different set of research topics like defense-related research, bioscience and biomedical research, and energy and environmental research."

These events have led to follow-up meetings, conversations, and agreements to explore potential relationships with several private sector high-tech and pharmaceutical companies. Emery has scheduled an ambitious agenda of additional LIINC events.

While the original grant funding from the Claude Worthington Benedum Foundation that established the LIINC program will expire soon, the WVU Research Office, and University deans from the STEM disciplines, the Business and Economic School and the Health Science Center have agreed to sustain the program through 2014.

Learn more about LIINC at innovation.research.wvu.edu.



Civil and Environmental Engineering PhD graduate student Chenjie Wu's research focuses on testing water treatment methods.

New WVU Center addresses energy grand challenge



Developing the ability to store electricity in large-scale batteries could revolutionize the power industry, the manager of the U.S. Department of Energy's Stationary Energy Storage Program told a West Virginia University audience in October.

Dr. Imre Gyuk was in Morgantown to kick off the new Center for Electrochemical Energy Storage at WVU's National Research Center for Coal and Energy. His talk demonstrated how storage holds the potential for cleaner energy production.

Gyuk explained that the current electricity system must balance power generation with customer demand in real time. Failure to balance the system would lead to massive power outages.

To maintain balance, utilities must ramp fossil fuel plants up or down. This is accomplished by increasing or decreasing the amount of fuel the plants use to produce electricity.

Incorporating renewable wind energy in the supply chain poses a major challenge since wind is out of humans' direct control and typically blows hardest at night when demand is lowest. Affordable storage options would provide an outlet for excess generation when customer demand is low.

The new center's research team recognized the opportunity to address what some have labeled a "grand challenge" in energy.

To compete for the \$1.35 million Research Challenge Fund award from the West Virginia Higher Education Policy Commission Division of Science and Research, Xingbo Liu, associate professor of Mechanical and Aerospace Engineering in the Statler College of Engineering and Mineral Resources and principal investigator, recruited computational scientists, chemists, a coatings expert, and a characterization specialist from STEM disciplines across WVU to develop the technical program. He also recruited legal and development specialists to propose a complementary technology transfer program.

The team submitted a proposal that Dr. Jan Taylor, director of the Division of Science and Research, said received the highest ratings ever for any submission to the Research Challenge Grant competition. She congratulated the group led by Dr. Liu and including WVU faculty and staff from the Statler College, the Eberly College of Arts and Sciences, the School of Medicine, the College of Law, and the NRCCE. "We could tell that this truly was a team effort," she said.

The center's initial research will focus on sodium super-ionic conducting (NaSICON) particles combined with a sodium-conducting glass, a technology for which WVU is seeking a full patent.

Liu said that graduate courses in the field of energy storage are planned that will deliver Master's and doctoral graduates ready to meet industry's needs.

"America needs affordable, large-scale electrochemical storage systems, Liu said. "Storage will not only help bring renewable power generation online but also can help traditional fossil fuel plants operate at their most efficient, avoiding wear and tear on equipment and eliminating emissions that occur when plants are ramped up and down."

Above: Graduate Research Assistant Meng Yao (right) and Research Assistant Professor Hui Zhang discuss sodium super-ionic conductors (see inset), the novel electrolyte materials for utility-scale electricity storage. Photo by Chitra Tatachar, West Virginia University Office of Research

Modern meets rustic in WVU Solar Decathlon team's design for **energy-efficient home**

"The houses that are usually entered focus on being new, modern and innovative. But they lack the quality that's most important to Americans – the feeling of 'home.' Our log-style home is cozy, warm and welcoming. We're bringing old and new together for a comfortable, efficient environment."

Brigid Cain
WVU Civil Engineering major



A West Virginia University group is one of 20 international teams competing in the 2013 Solar Decathlon, a collegiate design-and-build competition hosted by the U.S. Department of Energy. The WVU house is the first log-style home accepted into the decathlon.

Eighteen students across multiple disciplines began piecing together the solar-powered log home in the fall 2012 semester on a site near the Student Recreation Center. The home will be disassembled and transported to the competition in Irvine, California and reassembled for the October 2013 competition.

WVU Civil Engineering major Brigid Cain and her teammates hope to woo judges with their design, which merges innovative technologies with the rustic comfort of the countryside.

"The houses that are usually entered focus on being new, modern and innovative," Cain said. "But they lack the quality that's most important to Americans – the feeling of 'home.' Our log-style home is cozy, warm and welcoming. We're bringing old and new together for a comfortable, efficient environment."

The decathlon team includes students from Creative Arts, the College of Agriculture, Natural Resources and Design, the School of Journalism and Business & Economics. In addition to learning how to build an environmentally friendly house, students are picking up valuable lessons on collaboration.

"I've learned so much about different disciplines and their strengths," said Corie Posey, an interior design student from Philippi, who works on the engineer-heavy team. "As an interior designer, I've realized that I could not do my job without engineers. I've developed a greater respect for other disciplines."

The winner of the competition will be the team that best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency.

Learn more at energyresearch.wvu.edu.

WVSU earns big grants, expands into Tech Park

West Virginia State University will receive grant funds totalling more than \$1.6 million from the USDA National Institute of Food and Agriculture (NIFA).

"This is great news and speaks volumes to the fact that we have talented research and teaching faculty at the university," says Dr. Orlando F. McMeans, vice president for Research and Public Service.

WVSU is one of 18 institutions to compete in the program, exclusive to the nation's 1890 land-grant universities, but also one of the smallest. The grants fund seven proposed research projects, including joint initiatives with Alcorn State University in Mississippi and Southern University in Louisiana.

Three of the projects focus on research to improve agriculture production in West Virginia. The work will focus on plant breeding techniques meant to increase disease resistance in crops such as tomatoes and melons; understanding reproductive barriers to improve cultivated tomatoes; and studying the health benefits of squash and pumpkins, including their potential as anti-cancer and anti-diabetic agents. Other projects deal with the study of hibiscus flowers and the application of genomic technologies for Appalachian mine site reclamation.

Some of the lab-based work will be managed out of WVSU's new space at the West Virginia Regional Technology Park in South Charleston. Staff members moved into the hilltop facility in July and occupy three labs and multiple offices. WVSU was the first university to have a presence at the Tech Park site.

The remaining NIFA-funded projects are teaching grants. One will expose college students to global genomic impacts in agriculture, and another will use biotechnology and crop diversity-oriented curricula to recruit high school students into science, technology, engineering and mathematics disciplines.

The 1890 Institution Teaching and Research Capacity Building Grants Program focuses on advancing cultural diversity in the scientific and professional work force by attracting and educating more students from underrepresented groups.



Plant biotechnology research technician Robin Turner in new laboratory space at the West Virginia Regional Technology Park.



WVU Astronomy professor 15th WVU faculty member to win NSF CAREER award

The National Science Foundation has awarded D.J. Pisano, WVU assistant professor of Physics and Astronomy, a prestigious \$800,000 CAREER award to continue searching for gases that many consider elusive "star fuel."

Pisano's observations involve studying subtle changes in wavelength patterns on a faraway star.

CAREER awards are designed to help young faculty on their way toward bright careers and tenure.

Pisano is also working to put science in the hands of everyone, even middle school students. Half of the grant's focus is on the development of a project to teach local middle school students about the electromagnetic spectrum and have them adopt a galaxy to study through remote access to a small radio telescope at the National Radio Astronomy Observatory in Green Bank and optical telescopes across the world.



Marshall University scientist receives NSF grant for laboratory equipment



A Marshall University scientist has received a \$338,845 National Science Foundation grant to fund high-end laboratory equipment that will be used by researchers and students in biochemistry, chemistry and physics.

The grant to Dr. Derrick Kolling, assistant professor of chemistry, along with colleagues at Marshall and the University of Charleston, was awarded competitively through the NSF's Major Research Instrumentation program. Kolling will use the funds to purchase a device called an electron paramagnetic resonance spectrometer.

The spectrometer incorporates a powerful magnet and a source of microwaves to observe unpaired electrons—many of which are known as free radicals.

Kolling says he and colleagues will use the new equipment to enhance their ongoing research projects to improve alternative energy production, help detect environmental toxins and chemical and biological threats, design more efficient semiconductors and safer radioactive waste disposal systems, and further the medical community's understanding of the disease atherosclerosis or "hardening of the arteries."

"At least five of our faculty members in three departments will be using this device in their research right away," he said. "Just as importantly, it will immediately benefit our students. Studies show that student interest in science is enhanced by their use of high-end equipment. Through the hands-on experience they gain here, they will become better trained and more scientifically sophisticated."

He added that the University of Charleston collaborated on the grant proposal and UC faculty will also use the instrument.



University of Charleston pharmacy professor receives \$50,000 research grant

A University of Charleston School of Pharmacy professor will use a \$50,000 research grant from the W.Va. Division of Science and Research toward developing a transdermal patch to treat low back pain.

Dr. Gagan Kaushal, an associate professor, received the grant as part of an incubator grants program for primarily undergraduate institutions and community and technical colleges.

The goals of the grant, to enhance student training in nano- and bio-technology, as well as to grow and sustain statewide research collaboration among institutions, align well with UC's mission of advancing the profession of pharmacy through research, said Dr. Michelle Easton, Pharmacy school dean. "In addition to exposing our students to research, the project outcome -- pain relief -- will provide value and benefit to those we serve in the Appalachian community and beyond who suffer from chronic low back pain."



We are the [XSEDE] Champions

Jack A. Smith, Ph.D.

Each summer, Kay Hunt of Purdue University gathers her growing flock of volunteers at the annual XSEDE Conference to meet face-to-face, participate in workshops, share best practices, make plans for the following year, and be subjected to the rock band Queen's "We are the Champions" at a closing banquet that celebrates the year's achievements.

XSEDE (eXtreme Science and Engineering Discovery Environment) is the latest incarnation of TeraGrid, a National Science Foundation-funded project that attempts to build a virtual organization of academic scientists and engineers to share resources, data, and expertise in solving large computational or data-intensive problems. These computational resources and services are spread over a dozen institutions of higher education, including six major supercomputing centers.

The XSEDE organization has a network of campus and regional champions who represent individual institutions and regions. Through my role as Cyberinfrastructure Coordinator for the Higher Education Policy Commission, I serve as regional champion for West Virginia. I also represent Marshall University at the Campus level.

This past summer I had the honor of being selected as one of four Campus Champion Fellows. As such, I am paired with Dr. Yaakoub El Khamra at the Texas Advanced Computing Center (TACC) at the University of Texas at Austin. During the one-year fellowship, the first of its kind, I will have the opportunity to gain intense hands-on experience working with the academic investigators to help them make the best use of their allotted supercomputing resources. Being a Campus Champion Fellow won't necessarily be easy, as it involves 400 hours of work, regular status reports, and a final presentation at next summer's annual XSEDE conference.

My first project is with Dr. Thomas Bishop at Louisiana Tech University helping him and students in his Theoretical Molecular Biology Lab perform thousands of molecular dynamics simulations on protein structures using a workflow tool called "BigJob." That tool, to distribute resource-demanding tasks across XSEDE's computing and data resources, is under development at Rutgers University in New Jersey.

With TeraGrid transitioning into XSEDE, the emphasis is shifting from traditional High-Performance Computing (HPC), geared mostly toward massively parallel jobs, to a much broader range of services, including High-Throughput Computing (HTC), geared toward large collections of serial jobs, large-memory jobs, "Big Data" applications, distributed network-intensive (Gigabit) applications, remote visualization, and many more outreach activities, especially to STEM students. Another important change in focus is the deliberate inclusion of support for regional and campus resources through the Campus Champion and Campus Bridging programs, helping make the transition between resources in all directions as seamless as possible.

This latter area of focus is where I find the greatest synergy in my roles as Cyberinfrastructure Coordinator for HEPC and Regional Champion for XSEDE.

And when Purdue's Kay Hunt plays the final verse of "We Are the Champions" at next summer's XSEDE conference, it will be with the knowledge that all available campus, regional and national super computing resources appear to West Virginia's research and educational community as one seamless resource.

Jack A. Smith, Ph.D.

Cyberinfrastructure Coordinator | Division of Science and Research

WV Higher Education Policy Commission - and - Regional Champion and ECSS Fellow for XSEDE

XSEDE (eXtreme Science and Engineering Discovery Environment) is the latest incarnation of TeraGrid, a National Science Foundation-funded project that attempts to build a virtual organization of academic scientists and engineers to share resources, data, and expertise in solving large computational or data-intensive problems. These computational resources and services are spread over a dozen institutions of higher education, including six major supercomputing centers.





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FROM THE DIRECTOR OF SCIENCE AND RESEARCH:

Women in STEM



I was pleased to be a part of TechConnect West Virginia's Women in Technology conference held at Oglebay Park Resort in Wheeling in October. A large group of women, including academics, business owners and students, convened to discuss the role of women in science, technology, engineering and mathematics. The event covered a host of topics including the value of mentors, starting your own tech-based business, using social media, work-life balance, how to pitch your ideas, and the importance of STEM education specifically for young women. The participants were highly engaged and energized.

While women make up slightly more than half the population, only 10 percent of tech-based businesses are owned by women. In science and engineering, women are underrepresented in all fields except biology.

We need to encourage young women to pursue STEM degrees from an early age. We are losing half the potential of our country when girls drop out of STEM before they reach high school. Our state and nation

cannot afford to lose the talent of any of these young women if we are to compete nationally and internationally in the future.

With the adoption of the new core standards in our public schools, including the Next Generation Science Standards, all of our students will be better prepared for college and the work force. These new standards will require retraining of current teachers and a restructuring of our teacher preparation programs at our colleges and universities. I am confident that our institutions of learning, both K-12 and college, will meet this challenge.

Learn more about the Women in Technology conference and other TechConnect WV programs at <http://techconnectwv.org>.

Jan Taylor, Ph.D.
Director of Science and Research
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