

# DIMENSIONS *of* DISCOVERY

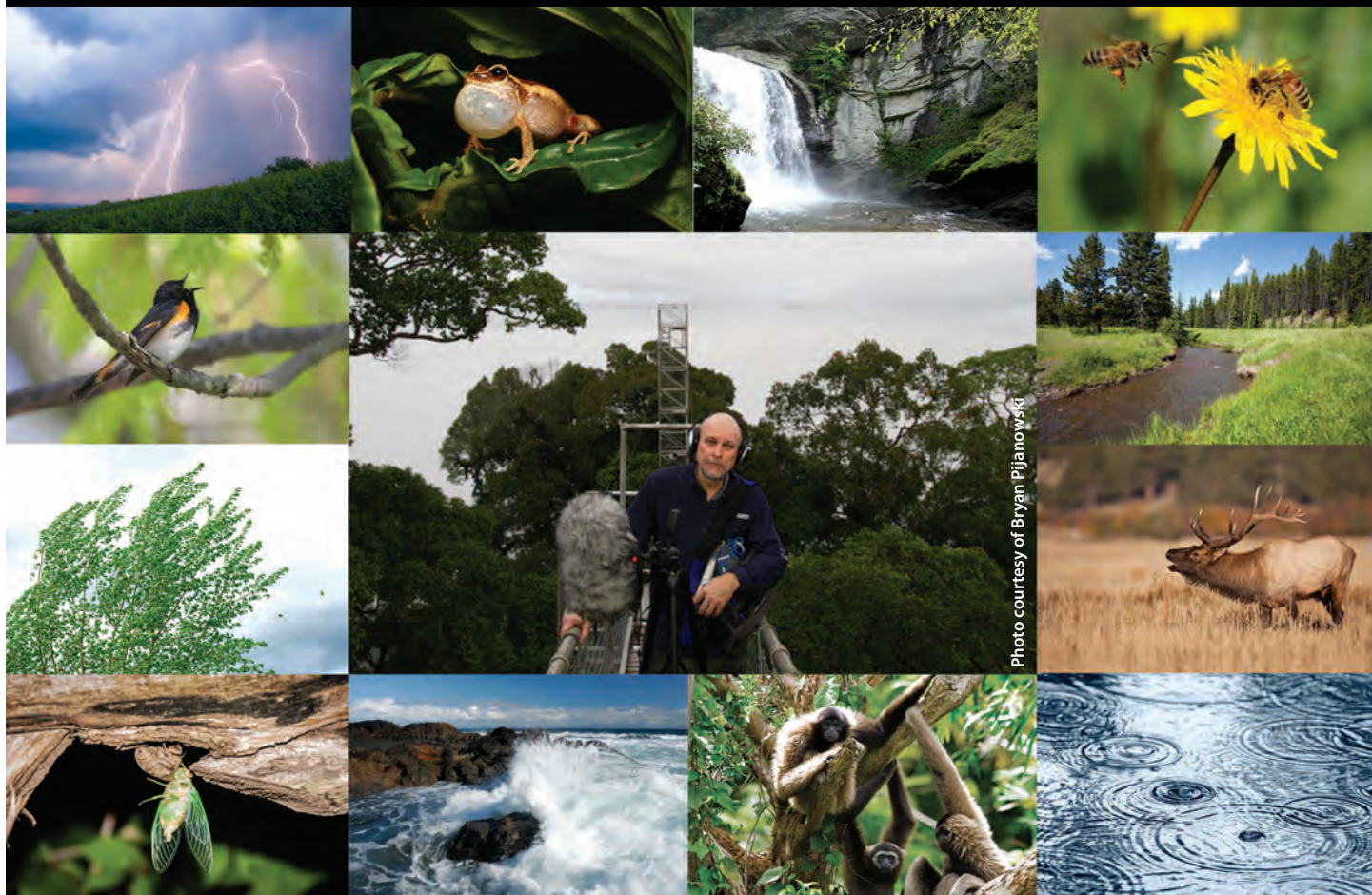


Photo courtesy of Bryan Pijanowski



## Purdue's Discovery Park Launches Global Soundscapes Research Center to Capture Vanishing Sounds of Nature

### Welcome

**"Earth and sky, woods and fields, lakes and rivers, the mountain and the sea, are excellent schoolmasters, and teach some of us more than we can ever learn from books." — John Lubbock**

In 1970, 2,000 colleges, 10,000 K-12 schools and 100s of communities around the United States celebrated the first Earth Day. Now, as we look forward to the 44th annual celebration on April 22, we examine how Purdue researchers are seeking to preserve and gently harness our planet's precious resources. In this issue, read about an ecologist that is recording nature's vanishing sounds, a team that seeks to preserve rare metals, and plant species that could hold the key to new treatments for retinal degeneration. ■

Purdue University ecologist **Bryan Pijanowski** is helping pioneer a research field aimed at preserving natural soundscapes and highlighting their bellwether role in alerting scientists to vanishing environmental habitat changes by species.

Through the new Center for Global Soundscapes in Purdue's Discovery Park, the forestry and natural resources professor will examine how animals interact — even across species — amid global habitat modification as well as develop science-related K-12 education curriculum materials.

"There may be some very unique soundscapes around the world that, through normal human activities, could be lost forever," Pijanowski said.

To launch the center, Pijanowski in recent years has received \$3 million in funding from the National Science Foundation, Purdue's Office of the Vice President for Research, Discovery Park, Purdue's Center for the Environment, the Envision Center, Information Technology at Purdue (ITaP) and other partners.

Collaborating with researchers and educators at Purdue and across the globe in the sciences, engineering, humanities and other areas, the Center for Global Soundscapes will work to advance the 3-year-old research field of soundscapes by:

- » Producing a digital theater IMAX show that will combine visual and acoustic elements gathered, filmed and recorded by Pijanowski and his fellow soundscape researchers.

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## National Academy of Engineering Elects Purdue Prof

**Jan Allebach**, the Hewlett-Packard Distinguished Professor of Electrical and Computer Engineering, has been elected to membership in the National Academy of Engineering (NAE.)

Election to the NAE is among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made outstanding contributions to “engineering research, practice, or education, including where appropriate, significant contributions to the engineering literature,” and to the “pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education.”

In its announcement of his election, and that of 66 other new members and 11 foreign associates, the NAE cited Allebach’s work in developing algorithms for digital image half-toning for imaging and printing. ■



Jan Allebach

## Chinese Medicinal Plants May Hold Key to New Retinal Degeneration Therapies

In the 16th century, at the height of the Ming Dynasty, physician Li Shizhen penned the *Compendium of Materia Medica*, still considered the most comprehensive tome for diagnosing and treating patients using Chinese herbal medicine. In the 1950s, provincial health officials established a 3D version of sorts of Shizhen’s encyclopedic work, creating the Guangxi Medicinal Plants Botanical Garden in Nanning, China, to showcase, study and preserve more than 7,400 medicinal plants.

Purdue Prof. **Yuk Fai Leung**, biological sciences, believes that this lush garden of 500 acres may hold a key to new treatments for retinal degeneration, an irreversible condition that affects millions of children and adults worldwide.

“There are not many effective treatments, but the vision loss is usually a gradual process, which means there is a significant window for intervention,” he says. “Drugs or therapies that could slow the progression of the disease could allow people to hold onto their vision longer and greatly improve their quality of life.”

The agreement between Purdue and the Guangxi Botanical Garden will provide Leung access to traditional herbs whose active ingredients could be extracted, replicated and turned into potential compounds. He’s also working with the Eye Hospital at Wenzhou Medical University to build patient-specific eye disease models based on a mutation identified in Chinese patients.

And he’s leading a collaboration between Purdue, the Joint Shantou International Eye Center of Shantou University and the Chinese University of Hong Kong. Together, they have established a laboratory at Purdue where researchers will use zebrafish to screen compounds that may have visual benefits.

“The partnership connects clinical and basic research so that we can identify a problem in patients, take it back to the laboratory for study, develop and test new therapies, and then bring back a solution to the patients,” Leung says. “We hope to pinpoint the compounds in these traditional herbs that are influencing vision and use them as a model to create even more effective and safe compounds for treatment.” ■

Photograph by Vincent Walter



Yuk Fai Leung has established a laboratory at Purdue with the Joint Shantou International Eye Center of Shantou University and the Chinese University of Hong Kong where researchers will use zebrafish to screen compounds that may have visual benefits.



## Robotic Versatile and Flexible System Could Revolutionize Rural, Battlefield Surgeries

Highly specialized surgical expertise tends to collect in major medical centers and metropolitan areas, which is a problem if you're one of the millions of people not living in one. Industrial engineering assistant professor **Juan Wachs** and computer science associate professor **Voicu Popescu** considered this challenge of rural America as an opportunity. They proposed a new telementoring system using robotics and augmented reality to enable surgeons in rural areas to receive expert training in real-time without losing any benefits of an in-person trainer-trainee relationship. It's called STAR (System for Telementoring with Augmented Reality).

STAR combines Wachs' gesture recognition and robotics research, Popescu's augmented reality research, and trauma surgery guidance from Dr. Gerry Gomez, chief trauma surgeon at Eskinazi Health in Indianapolis. "All of this technology either exists or has been discussed in the industry, but nobody has put it together to create the experience," Wachs says.

In current systems, both the surgeon mentor and mentee use headsets and laptops to view and communicate. "It works, but it's not the most natural way for surgeons to work," says Wachs. STAR will use augmented reality to give the mentor a projected patient on a table. The mentee will use a tablet over the patient as a "window" with the mentor's guidance appearing onscreen so he never takes his eyes off of the patient. STAR includes the TAURUS robot, whose arms and hands will act as the mentor's hands in the operating room, assisting, pointing things out, and handing tools, just as an in-person mentor would.

Purchased with an Office of the Vice President for Research equipment grant, and in collaboration with Profs. **H. Zelaznik**, **C.S Lee**, **B. Duerstock**, **E. Culurciello**, **F. Winkler**, **C. Z. Qian** and **H. Millard**, TAURUS' impact won't just be felt at home. It is also poised to revolutionize battlefield surgery, where time is of the essence and flying a patient to the nearest expert may be infeasible. "This system means that surgeons can perform more specialized operations in the field because they can have access to real-time specialist guidance. TAURUS is also much smaller than many surgical robots, which makes it more practical for field hospitals," he says.

Wachs' team recently received a grant from the U.S. Armed Forces to make STAR a reality. They expect to spend three years developing the technology before beginning tests. ■

*Writer: Amira Zamin is a Communication Specialist in the Regenstrief Center for Healthcare Engineering at Purdue University*



Juan Wachs

Photograph by Vincent Walter

## Three Purdue Professors Elected as AAAS Fellows

Three Purdue University professors were awarded the distinction of fellow from the American Association for the Advancement of Science, the world's largest general scientific society. They are:

» **Robert L. Geahlen**, distinguished professor of medicinal chemistry and molecular pharmacology, for distinguished contributions to the field of receptor signaling;



» **Ananth Grama**, professor of computer science, for distinguished contributions to the field of high-performance computing and computational science; and

» **Jeffrey R. Lucas**, professor of biological sciences, for distinguished contributions to animal behavior, optimality modeling, and animal communication.



These new AAAS members, who will be honored Feb. 15 at the association's annual meeting in Chicago, bring Purdue's total to 57. ■

*Writer: Elizabeth Gardner is a communications and marketing specialist for Purdue Marketing and Media.*

## Engineering Profs Receive CAREER Grants

Two College of Engineering faculty members have received CAREER grants, the National Science Foundation's Most Prestigious Honor for young researchers.

**Dionysios Aliprantis**, associate professor of electrical and computer engineering, was honored for his proposal, "Sculpting Electric Machines for Unidirectional Motion."



**Karen Marais**, assistant professor of aeronautics and astronautics, was honored for her proposal, "Accidental Knowledge: Using Accidents and Other Systems Engineering Failures to Inform Research and Education in Systems Engineering." ■



## Two Profs Named Fellows of Inventors' Organization

Two Purdue professors have been named fellows of the National Academy of Inventors (NAI): **Rakesh Agrawal**, the Winthrop E. Stone Distinguished Professor in the School of Chemical Engineering, and **Michael Ladisch**, Distinguished Professor in the Department of Agricultural and Biological Engineering and Weldon School of Biomedical Engineering and director of Purdue's Laboratory of Renewable Resources Engineering (LORRE).

They are among 143 new members who will be officially recognized during an NAI induction ceremony on March 7 at the U.S. Patent and Trademark Office headquarters in Alexandria, Va.

Agrawal holds 118 U.S. patents, nearly 500 non-U.S. patents and has authored 107 technical papers. In 2011 he received the National Medal of Technology and Innovation from President Barack Obama. In 2013 he was elected to the American Academy of Arts and Sciences, one of the nation's oldest and most prestigious honorary societies.



Rakesh Agrawal

Ladisch has authored numerous journal articles, papers and patents, as well as two textbooks. He has chaired National Research Council committees on bioprocess engineering and opportunities in biotechnology for future Army applications. ■



Michael Ladisch

*Writer: Emil Venere is a writer/editor with Purdue Marketing and Media.*

## Commercialization Award Affirms Lifetime of Innovation for Professor

**Pete Kissinger** is not your typical academic. And that's just fine with the longtime Purdue chemistry professor and technology and process innovator. Kissinger, who has launched four companies and assisted in the startup of a dozen more during his stellar career, is the recipient of Purdue's 2014 Outstanding Commercialization Award.



Pete Kissinger

The award, established with an endowment gift from the Central Indiana Corporate Partnership Foundation, is given annually to a faculty member in recognition of outstanding contributions to, and success with, commercializing Purdue research discoveries.

To Kissinger, a primary role of all faculty members, particularly those at land-grant universities like Purdue, is to work to educate leaders of the future and innovate to make the world a better place.

"Entrepreneurship has been a cornerstone of academia ever since the Morrill Act of 1862 with its mandate to advance ideas and innovations to make our lives more rewarding and productive," he says. "Our economy back then and still today is not driven by academia. Academia drives entrepreneurship. This is all about the human spirit." ■

*Writer: Phillip Fiorini is a senior writer/editor with Purdue Marketing and Media.*

## Researchers Join Effort to Solve Shortage of Rare Earth Metals Critical to Energy Security

A Purdue research team is working with colleagues from across the country to develop solutions to shortages of rare earth metals and other materials critical for U.S. energy security.

The U.S. Department of Energy (DOE) is investing \$120 million over the next five years to launch the Critical Materials Institute (CMI) as the newest DOE Energy Innovation Hub. Purdue will receive up to \$2.5 million over the next five years for its work.

"As a partner of the Critical Materials Institute, Purdue contributes its expertise in manufacturing, design and lifecycle engineering," said **Carol Handwerker**, the Reinhardt Schuhmann Jr. Professor of Materials Engineering. "Purdue also is a leader in sustainable manufacturing and had one of the first national courses on critical elements."

Joining Handwerker on the Purdue CMI team are **Ananth Iyer**, the Susan Bulkeley Butler Chair in Operations Management at Krannert; **John Sutherland**, the Fehsenfeld Family Head of Environmental and Ecological Engineering; and **Fu Zhao**, an associate professor of mechanical engineering and environmental and ecological engineering. ■

*Writer: Phillip Fiorini is a senior writer/editor with Purdue Marketing and Media.*



Extruded Europium (Eu) Metal, whose colors arise from various levels of oxidation, is one of the rare metals that will be investigated by the new Critical Materials Institute.

Photograph courtesy of The Ames Laboratory, U.S. Department of Energy.



Photograph by Vincent Walter

Ron Turco

## Agronomy Prof's Environmental Achievements Lead to Land Grant Award

**Ron Turco**, a professor of agronomy and director of the Purdue Water Community and the Indiana Water Resources Research Center, has been selected as the 2013 recipient of the Spirit of the Land Grant Mission Award.

The award recognizes faculty members who have developed a comprehensive program for integrating and promoting Purdue's core missions of discovery, engagement and learning in order to benefit agriculture, health and human sciences or veterinary medicine on a national or international level.

Turco was chosen for his achievements in creating and disseminating knowledge for ameliorating important environmental problems for Indiana and the nation, along with his collaborative and transdisciplinary approaches to problem-solving. He presented the Spirit of the Land Grant Mission Award lecture on February 21, 2014 in the Deans Auditorium, Pfendler Hall. ■

## Two Purdue University Researchers Will Receive Presidential Early Career Awards for Scientists and Engineers

**Jeffrey D. Karpicke**, James V. Bradley Associate Professor of Psychological Sciences, and **Tamara Moore**, an associate professor of engineering education, are among the 102 recipients that will be honored by the White House later this year.

The award, also known as PECASE, is the highest honor bestowed by the U.S. government on science and engineering professionals in the early stages of their independent research careers.

Presidential Early Career Awards embody the high priority the Obama Administration places on producing outstanding scientists and engineers to advance the nation's goals, tackle grand challenges, and contribute to the American economy.

"The impressive achievements of these early-stage scientists and engineers are promising indicators of even greater successes ahead," President Obama said. "We are grateful for their commitment to generating the scientific and technical advancements that will ensure America's global leadership for many years to come." ■



Jeffrey D. Karpicke



Tamara Moore

## Researchers Receive \$130K from Trask Innovation Fund

Three researchers in Purdue University's colleges of Engineering and Science have received more than \$130,000 from the Purdue Research Foundation-managed Trask Innovation Fund to develop their work. They are:

- » **Cagri A. Savran**, associate professor of mechanical engineering, \$50,000, for "High-throughput Cell Detection for Cancer Diagnostics." The technology could detect circulating tumor cells in bodily fluids in an accurate, scalable manner.
- » **Mahdi Abu-Omar**, R. B. Wetherill Professor of Chemistry-Inorganic Chemistry, \$50,000, for "Selective Catalysis for the Production of High Value Flavor and Fragrance Chemicals from Wood Biomass." The technology allows the development of high value chemicals from lignin, which normally is discarded from wood biomass, without expensive processing.
- » **Saurabh Bagchi**, professor of electrical and computer engineering, \$30,815, for "Achieving Predictable Performance on the Public Cloud." The technology allows cloud computing virtual machines to reconfigure to maintain performance of the physical machine in the face of interference.

The fund is a development program to assist faculty and staff whose discoveries are being commercialized through the Office of Technology Commercialization.

The next Trask Innovation Fund proposal submissions from Purdue faculty and staff are due **March 14**. Information about submissions is available at <http://otc-prf.org/node/337>. The Trask Advisory Council will meet **May 2**. ■

*Writer: Steve Martin, writer/publicist, Marketing and Communications for Purdue Research Foundation*

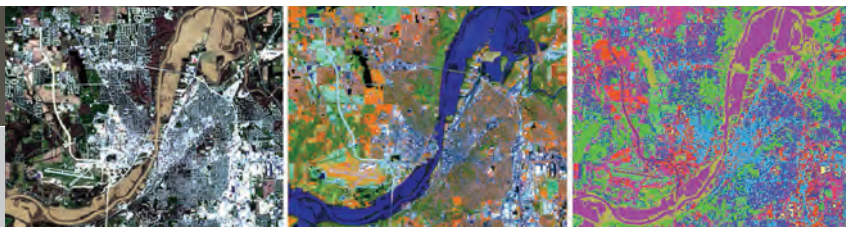


## Purdue Honors 16 with Laboratory Equipment Awards

The following professors have been honored with Laboratory Equipment Awards from Purdue:

- » **Alina Alexeenko**, Aeronautics and Astronautics, \$40,000
- » **Todd Applegate**, Animal Science, \$65,270
- » **Antonio Bobet**, Civil Engineering, \$97,927
- » **Jean Chmielewski**, Chemistry, \$59,244
- » **Jennifer Freeman**, Health Sciences, \$39,745
- » **Barbara Golden**, Biochemistry, \$99,800
- » **Gregory Hockerman**, Medicinal Chemistry and Molecular Pharmacology, \$99,449
- » **Julia C. Liu**, Chemical Engineering, \$94,650
- » **Richard Mattes**, Nutrition Science, \$43,820
- » **Jean-Christophe (Chris) Rochet**, Medicinal Chemistry and Molecular Pharmacology, \$82,584
- » **M. Fernanda San Martin-Gonzalez**, Food Science, \$78,000
- » **Dan Szymanski**, Agronomy, \$99,328
- » **W. Andy Tao**, Biochemistry, \$71,789
- » **Lynne Taylor**, Industrial and Physical Pharmacy and Chemical Engineering (by courtesy), \$62,750
- » **Carl Wassgren**, Mechanical Engineering, \$78,900
- » **Timothy Zwier**, Chemistry, \$97,600

Research Equipment Programs were established to support equipment needs for research and scholarly activities. Equipment is essential to the foundation and advancement of research intensive universities like Purdue. While a portion of the equipment funding comes from private and public sources, researchers often need internal funds to fill existing gaps. ■



This is a satellite image of flooding on the Wabash River between Lafayette and West Lafayette, Ind., in 2013. Shown are variations in the wavelengths of light reflected from the surface to highlight the extent of water and features such as vegetation and bare ground. The last version represents a grouping of the data into various land cover classes. (Image by Information Technology at Purdue)

## Geospatial Data Project Will Let Almost Anyone Put Almost Anything on Map

A powerful Web-based system enabling people worldwide to better predict such things as damaging floods and potential effects of climate change is the goal of a new \$4.5 million, four-year project at Purdue.

Funded by the National Science Foundation, the project will add geospatial data hosting, processing and sharing capabilities to Purdue's HUBzero platform. This should ease development of Web-enabled tools for probing and presenting geospatial data to help address pressing issues in the United States and around the globe.

"We want to have tools where people can integrate multiple data sets in the way they want and extract information based on these multiple data sets," says **Venkatesh Merwade**, associate professor of civil engineering.

**Nelson Villoria**, a research assistant professor at Purdue's Center for Global Trade Analysis, adds that not everyone has access to the fast Internet speeds and data analysis expertise available at universities like Purdue. "We're doing something that will lower the barriers to using this sort of information," he says.

The geospatial data project stems from earlier, specialized projects involving HUBzero and focused on causes and effects of droughts, water resources, and agriculture, land use and the environment.

"We have developed many map-driven and sophisticated online tools for modeling and visualization of geospatial data, which typically require significant geographic information system and software expertise," says **Carol Song**, a Purdue senior research scientist and the principal leader of the project. "In this project, we will be able to share what we have learned, expand on it and make it available to anyone through the HUBzero open source software."

Villoria, Merwade and Purdue research scientist **Larry Biehl** are co-leaders of the project. **Thomas Hertel**, Distinguished Professor of Agricultural Economics and executive director of the Center for Global Trade Analysis, is a project adviser.

The project is funded through the NSF's Data Infrastructure Building Blocks program. Several partners, from K-12 educators to large NSF projects, have signed on to test the new geospatial tools as they become available. ■

*Writer: Greg Kline is a science and technology writer for Information Technology at Purdue (ITaP).*



(L-R) Nelson Villoria, Carol Song, Larry Biehl and Venkatesh Merwade

Photograph by Greg Kline



Photograph by Mark Simon

Ignacio Lamata Martinez, left, a researcher at the University of Oxford in England, and Gemez Marshall, senior software engineer for NEEScomm IT at Purdue, discuss development of a system to integrate shared experimental data for global use. (Purdue University photo/Mark Simons)

## Purdue-led NEES Team Advances Data Systems for Earthquake Engineering

Researchers and computer software developers at the Purdue-led George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES) are advancing data systems to enable the seamless sharing of experimental research with earthquake engineers globally.

A NEES data interoperability project called Celestina Data will provide an ontology-based data access layer that exposes data — and makes it usable — to researchers anywhere. And Purdue researchers have developed a system that makes it easier to collect, share, explore and reuse data related to the impacts of earthquakes, hurricanes, tornadoes and floods. Called DataStore, the system automatically turns spreadsheets into searchable databases accessible to researchers globally.

“This is not a simple task, but these achievements will go a long way toward strengthening the earthquake engineering community across the globe,” said NEES director **Julio Ramirez**, a civil engineering professor at Purdue.

Celestina, which uses Semantic Web technologies, will encourage the reuse of the 20 terabytes of experimental data in the NEES Project Warehouse. It initially will be made available to earthquake engineering researchers in Europe before opening up to investigators in Asia, South America and elsewhere.

Joining Ramirez on the Celestina team are mechanical and civil engineering professor **Shirley Dyke** along with NEEScomm IT director **Brian Rohler**, senior software engineer **Gemez Marshall** and data curator **Standa Pejša**. Oxford University researcher Ignacio Lamata Martinez serves as lead developer.

The goal is to develop the system prototype, which will be fed by relevant databases in the U.S. and Europe, with a tentative rollout by September 2014. At that point, the group will engage international partners to expand the data integration effort. Researchers and students interested in seamless access to earthquake engineering data are in Japan, China, South Korea and elsewhere. ■

*Writer: Phillip Fiorini is a senior writer/editor with Purdue Marketing and Media.*

## Purdue Awards Non-Laboratory Grants to 17 Investigators

The Non-laboratory Equipment program was designed to support equipment needs in disciplines not driven by instrument-dependent research. Such disciplines include social sciences, humanities, liberal arts, education, management and libraries.

The following investigators have received Non-Laboratory Awards through Purdue’s new Research Equipment Grants program:

- » **Azza H. Ahmed**, Nursing, \$4,690
- » **Emily C. Bouck**, Educational Studies, \$1,803
- » **Susan Britsch**, Curriculum and Instruction, \$1,472
- » **Kazumi Hatasa**, Languages and Cultures, \$4,995
- » **Eva Haviarova**, Forestry and Natural Resources, \$15,651
- » **Ian Lindsay**, Anthropology, \$17,861
- » **Yukiko Maeda**, Educational Studies, \$1,505
- » **Michael McNamara**, Visual and Performing Arts, \$19,600
- » **Helen Patrick**, Educational Studies, \$4,990
- » **Gerald Shively**, Agricultural Economics, \$2,916
- » **Melanie Shoffner**, English, \$5,000
- » **Margie Snyder**, Pharmacy Practice, \$18,420
- » **Jessica L. Sturm**, Languages and Cultures, \$2,965
- » **Lisa VanZee**, Visual and Performing Arts, \$17,500
- » **Fabian Winkler**, Visual and Performing Arts, \$3,400
- » **Christine Wuenschel**, Visual and Performing Arts, \$2,365
- » **Sigrid Zahner**, Visual and Performing Arts, \$8,750 ■





## >> New on the West Lafayette Campus Map

Five new buildings on the West Lafayette campus — one already open and four others set to debut before the end of the calendar year — are helping to expand Purdue's research infrastructure in a number of academic areas.

### WANG HALL



**Cost:** \$28.7 million  
**Gross square footage:** 70,000  
**Opening:** May 2014

**Research capabilities:** organic synthesis, cell culture, analytical chemistry, molecule purification, biochemistry, molecular biology and fluorescent imaging

**Cost:** \$18 million  
**Leased square footage:** 41,000  
**Opening:** July 2014  
**Research facilities:** Energy Sources and Systems Research Complex, Fields and Optics Research Complex, and VLSI Laboratory Complex



**Cost:** \$15.9 million  
**Gross square footage:** 25,000  
**Opening:** March 2014

**Research capabilities:** innovative animal modeling, development of new therapeutics and in-vivo animal imaging

### MULTIDISCIPLINARY CANCER RESEARCH FACILITY







## DISCOVERY BUILDING



## LYLES-PORTER HALL

**Cost:** \$54 million

**Gross square footage:** 121,000  
(includes parking garage)

**Opening:** July 2014

**Research facilities:**  
Speech, Language and  
Hearing Sciences Lab



## HERRICK LABS EXPANSION

**Cost:** \$30.8 million

**Gross square footage:** 80,000

**Opened:** October 2013

**Research facilities:**  
Center for High Performance  
Buildings and Perception  
Based Engineering Lab

### Community Research IRB Available for Purdue Research Involving Local Health Care Providers

As you may be aware, research involving human subjects requires oversight to ensure sound experimental design and protect the rights of individuals who may participate in that research. At the core of this oversight is the Institutional Review Board (IRB). At Purdue, there are three separate IRB committees: the Biomedical Research Committee, the Social Science Research Committee and the newest, the Community Research Committee.

The Community Research Committee was formed in fall 2011 with local healthcare providers to review research protocols for projects involving a Purdue investigator and one or more of the participating community hospitals or physician groups: Franciscan St. Elizabeth Health, Indiana University Health Arnett and Horizon Oncology Research, Inc. That way, collaborative projects only need review by a single IRB. Committee members are drawn from all of the institutions represented in order to provide the appropriate level and type of review.

Researchers whose work would fall under the Community Research Committee's approval may complete the same submission forms as for any other Purdue research study. These forms can be found on the Purdue HRPP/IRB website at [www.irb.purdue.edu](http://www.irb.purdue.edu). As with any other study, forms will be routed automatically by staff to the correct committee (Social, Biomedical or Community).

For additional information or questions, please contact the HRPP/IRB office, phone: 494-5942, fax: 494-9911, or email: [irb@purdue.edu](mailto:irb@purdue.edu). ■

*Writer: Elizabeth Campbell is director of the Human Research Protections Program*



Scott Sheehan

Photography by Vincent Walter

### Purdue Welcomes Lilly Leader to Increase Life-Sciences Dialogue with Faculty

Life sciences is a \$50 billion business in Indiana. And recent rankings place Indiana among the nation's top five states in the number and concentration of life sciences jobs.

Indianapolis-based Eli Lilly and Company wants to see that industry bloom even bigger in Indiana and surrounding states. Scott Sheehan, Ph.D. senior director, discovery chemistry and research technologies at Eli Lilly and Company, has been appointed Midwest academic research liaison to increase the dialogue with researchers in academia.

"We have a long history of excellent research collaborations with Purdue, Notre Dame and IU, primarily, but those collaborations tend to come from already established relationships; oftentimes we have scientists at Lilly who had attended college or graduate school with faculty members," says Sheehan, who's been given office space on the third floor of Hovde Hall. "My role is to augment those excellent communications we already have and enable faculty who don't have a built-in relationship with Lilly to understand where the opportunities lie."

Each week since mid-2013, Sheehan has visited Purdue University to meet with faculty, gathering details on their work and informing them on Lilly programs that nurture and support academic research.

One of those is the Open Innovation Drug Discovery Program, which enables academic researchers from around the world to send compounds to Lilly for biological testing. In vitro biochemical testing is provided in kind, with the academic researcher retaining all IP rights to their work. "Lilly scientists are unable to see the structures of the compounds that have been submitted," he emphasizes. "By providing this value, we know we can help advance academic science and build relationships."

Other programs include the Lilly Research Awards Program (LRAP), an internal Lilly program in which Lilly scientists can submit a proposal in connection with external scientists. Some of these competitive Lilly awards support collaborations with Purdue investigators. Another program, the Lilly Innovation Fellowship Award (LIFA), pairs a postdoctoral scientist with their

academic mentor and a Lilly scientist to advance a innovative research proposal developed by the fellow. LIFA applications are by invitation only, and Purdue University has received this honor of invitation to participate in 2012 and 2013.

Sheehan notes, however, that he is not only visiting Purdue to raise awareness of existing programs. "I also want to look for additional novel ways we can interact through sharing of capabilities or experience to advance research on the academic campus," he says. "When scientists get together and talk, great things happen. My goal is to forge relationships from which new creative approaches come to help both institutions meet their research goals."

Sheehan's appointments at Purdue are currently being coordinated by **Geanie Umberger**, assistant vice president for corporate and foundation relations. Contact her at 496-3723 or [gumberger@purdue.edu](mailto:gumberger@purdue.edu). ■



## Purdue e-Pubs Surpasses 6 Million Downloads

With so many groundbreaking discoveries and research findings occurring at Purdue University, there is one place on campus providing free global online access to this scholarship—the Purdue e-Pubs institutional repository. In early 2014, Purdue e-Pubs surpassed 6,000,000 downloads. With over 2,000,000 downloads recorded just in the past year, Purdue e-Pubs continues to advance the impact of Purdue scholarship at the global, national, and local level. Purdue University Libraries began providing the Purdue e-Pubs service to the campus community in 2006 as a means to share research and scholarship openly. The repository now includes over 36,000 items in a range of media, from text to video, all presented in a stable, citable way.

As many funding agencies change their requirements to ensure open accessibility to funded research findings, to fulfill these requirements Purdue e-Pubs provides several services to faculty to openly share previously published research. Support is offered by library staff in checking permissions, tracking down copies of papers, and uploading them to the repository on their behalf.

Another important function Purdue e-Pubs plays is to provide online publishing support for original publications, including niche open access journals, technical reports, theses and dissertations, white papers, conference proceedings, posters, and student scholarship. Value-added publishing services are provided in collaboration with Purdue University Press, and all content is indexed by Google Scholar.

Measuring and reporting impact is an important part of the Purdue e-Pubs service. As well as using Google Analytics to gather qualitative information, the repository issues monthly download notifications to authors. These metrics allow authors the opportunity to demonstrate the reach of their scholarship, not only to academic colleagues and administrators, but to taxpayers, policymakers, and media outlets.

Purdue e-Pubs works in tandem with the other Libraries services and repositories to serve the full spectrum of the Purdue community's scholarly communication needs. Recently, for example, the Purdue University Research Repository (PURR) and Purdue e-Pubs worked with the Joint Transportation Research Center to interlink research data in PURR to a published technical report in Purdue e-Pubs. In the coming months, Purdue e-Pubs will be working alongside the Purdue Conferences Division and the Purdue University Press to add the proceedings of several Purdue-hosted conferences to the repository, as well as publishing formal proceedings volumes.

As the repository continues to garner more downloads, faculty, staff, and students are encouraged to consider adding their research and scholarship. For more information about Purdue e-Pubs and adding additional items, please contact **David Scherer**, scholarly repository specialist, Purdue University Libraries at 494-8511 or [dscherer@purdue.edu](mailto:dscherer@purdue.edu). ■

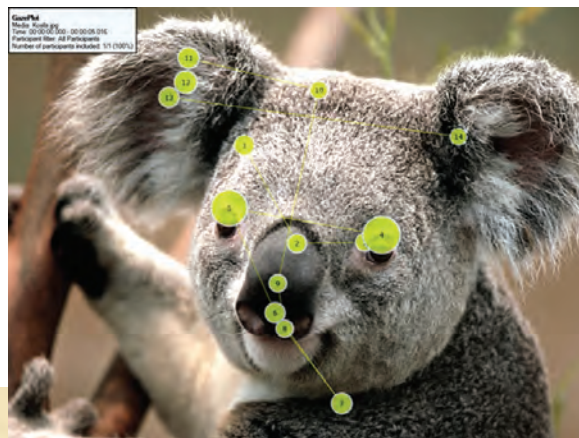
## DLRC Adds Eye Tracking Device

A new remote eye-tracking device at the Hall for Discovery and Learning Research Center (HDLR) is available for use by faculty, staff and graduate students engaged in STEM-related learning research. The equipment, located in the HDLR, can be used in the development and evaluation of digital curricula and instructional materials.

Development and evaluation of multimedia educational materials can be limited by inadequate knowledge of how the learner is interacting with the content. Eye trackers can fill this research gap, as they are ideal for studying how a learner uses any content that can be presented in a digital format.

The eye-tracking device, a Tobii model TX300, allows subjects to have freedom of head movement so they may interact naturally with the system as they would with any computer. It is capable of providing information about the location, sequence, and duration of a participant's gaze fixations.

The eye-tracking equipment is available upon request. Users of the eye tracker will be required to attend training. Contact **Debora Steffen** at [dmsteffen@purdue.edu](mailto:dmsteffen@purdue.edu) for more information. ■





## Purdue Debuts Startup Guide

As part of an ongoing strategy to foster entrepreneurship, Purdue innovators now have access to a Purdue Startup Guide that provides information on how to protect and commercialize an invention.

The 36-page online publication is a collaboration among the Purdue Foundry and Office of Technology Commercialization. It's available at <http://otc-prf.org/startup-guide>.

"Purdue innovations can be found in more than 100 countries around the world and benefit millions of people," says **Dan Hasler**, Purdue Research Foundation president. "We realize that moving an innovation through the commercialization process is a daunting task, and the startup guide is designed to help ease the process by providing a high-level overview for Purdue innovators, entrepreneurs and partners." ■

## Biological Laboratory Safety

Safety is paramount in all lab applications, but it is important to also know that research may be governed by a university-approved protocol. For example working with animals requires approval from the Purdue Animal Care and Use Committee (PACUC), working with biological agents requires approval from the Institutional Biosafety Committee (IBC), and working with human subjects requires Institutional Review Board (IRB) approval.

All of these university committees grant approval for specifically described experimental procedures and the safe handling of hazards. These descriptions act as a parameter for conduct during the research process. Any deviations or changes to this description require a protocol amendment prior to conducting that work. It is important to remember that the principal investigator is responsible for ensuring that all work follows approved protocol for safe operations in the laboratory. Review the information below as you conduct your work:

- » If your research expands or changes beyond the current protocol description, an amendment describing these changes must be submitted to the appropriate committee or REM before any work is done. Examples of these changes include adding new biohazardous agents, addition of lab staff, changes in locations, collaborations with other labs or processes that require higher containment. Persons entering the laboratory must be advised of the potential hazards and meet specific entry/exit requirements.
- » The sharing of IBC-covered biological agents should always have approval of the IBC prior to the transfer. The IBC will check protocol approvals (IBC, PACUC and IRB) and material transfer agreements, initiate protocol amendments, review biological agent related training and discuss specific handling procedures, such as labeling, packaging and shipping and communicate new requirements to the researcher.
- » In the event of injury or suspected exposure, all employees, whether undergrad, grad, part-time or full-time, must go to IU Health Arnett Occupational Health Center, Unity Healthcare's Regional Occupational Care Center (ROCC), or a local emergency room (if an emergency room is required). Purdue University Student Health (PUSH) and the Center for Healthy Living should not be used for ANY employee injury. Report the incident to Radiological and Environmental (REM) as soon as possible. Ensure that all personnel understand signs and symptoms of biological agent exposure, transmission routes, personal protective equipment requirements, decontamination and accident procedures.
- » Biological waste must be managed separately from chemical waste. The most common example in which chemical waste is mistaken for biological waste is agarose gel contaminated with ethidium bromide or heavy metals (i.e. arsenic, chromium). This type of material should always be managed as chemical waste. When both chemical and biological waste types exist, the biological agent(s) should be treated first. Once the biological agents have been deactivated by either autoclave or chemical disinfection, the remaining chemical waste should be submitted on a Hazardous Materials Pickup Request Form: [www.purdue.edu/rem/home/files/forms.htm#HMM001](http://www.purdue.edu/rem/home/files/forms.htm#HMM001)
- » Consider participating in the Occupational Health Programs, which are available for no charge. Although the risk of infection or exposure is low when using the proper precautions, certain individuals with increased risk may benefit from advanced screening. These individuals include immunocompromised and/or non-immune pregnant female workers, lab staff that have an autoimmune or chronic disease (no matter how well managed), individuals with heart disease, those taking immune-suppressing medications (e.g., chemotherapy, systemic steroids), or are a female of child bearing age or are pregnant or planning conception.

For further information, contact **Robert Golden**, biosafety officer, radiological and environmental management, at [rwgolden@purdue.edu](mailto:rwgolden@purdue.edu). ■



## >> Sponsored Program Year-to-Date Activity

### Awards by Sponsor

July 2013 to January 31, 2014

SPONSOR	FY2014 (Jul2013-Jan2014)		FY2013 (Jul2012-Jan2014)		% Change	
	NO.	\$ AMOUNT	NO.	\$ AMOUNT	NO.	\$ AMOUNT
National Science Foundation	158	59,468,250	170	52,063,143	-7%	14%
Dept. of Health and Human Services	135	18,580,378	125	18,641,543	8%	0%
Dept. of Defense	54	4,742,057	62	5,781,897	-13%	-18%
Dept. of Energy	123	16,449,015	141	16,239,869	-13%	1%
Dept. of Agriculture	64	11,843,717	68	13,995,729	-6%	-15%
National Aeronautics and Space Administration	15	2,564,352	13	1,399,524	15%	83%
Other Federal	49	11,921,456	44	5,354,352	11%	123%
Dept. of Education	10	758,436	6	594,590	67%	28%
Environmental Protection Agency	14	1,034,636	15	1,207,293	-7%	-14%
Dept. of Transportation	80	14,942,821	92	16,909,084	-13%	-12%
Agency for International Development	9	2,083,371	18	2,763,565	-50%	-25%
<b>Total Federal</b>	<b>711</b>	<b>\$144,388,489</b>	<b>754</b>	<b>\$134,950,589</b>	<b>-6%</b>	<b>7%</b>
Industrials and Foundations	92	13,888,467	76	12,614,589	21%	10%
State/Local Governments	987	52,313,823	924	39,231,281	7%	33%
Purdue Research Foundation/ Purdue University	36	4,449,659	33	2,545,860	9%	75%
Foreign Governments	502	16,136,529	272	3,412,969	85%	373%
<b>Total Non-Federal</b>	<b>1,617</b>	<b>\$86,788,479</b>	<b>1,305</b>	<b>\$57,804,699</b>	<b>24%</b>	<b>50%</b>
<b>Total Purdue System-wide</b>	<b>2,328</b>	<b>\$231,176,968</b>	<b>2,059</b>	<b>\$192,755,288</b>	<b>13%</b>	<b>20%</b>

Data provided by Sponsored Program Services

A comprehensive monthly awards list, including search and sort capabilities, is available online. Please visit the OVPR website at [www.purdue.edu/research/vpr/](http://www.purdue.edu/research/vpr/) or scan the QR code at right to view on your mobile device.



## MARCH

### Big Data in Agriculture Symposium

- » **When** March 5, 1- 8:30 p.m.
- » **Where** Beck Agricultural Center, 4540 U.S. 52 West
- » **Contact** Dennis Buckmaster, [dbuckmas@purdue.edu](mailto:dbuckmas@purdue.edu)
- » **Register** [https://purdue.qualtrics.com/SE/?SID=SV\\_09aGa1yEPLA1Rlz](https://purdue.qualtrics.com/SE/?SID=SV_09aGa1yEPLA1Rlz)

The symposium, organized through a collaboration of several Purdue academic departments, will examine questions and challenges related to leveraging public and private data and records to improve farmer decisions, advance research methods and enable improved policy. The event will include poster sessions, lightning- round presentations that will last five to six minutes each, and a series of presentations and team activities geared toward undergraduate students.

There is no limit to the number of faculty, staff and graduate student poster presenters or attendees. However, all presenters and faculty, staff or graduate student attendees must register.

### Education and Outreach Expo 2014: Partnering for Broader Impacts

- » **When** March 13, 12:30 - 2:30 p.m.
- » **Where** Stewart Center, Rooms 302-306
- » **Contact** Sally Bond, [sbond@purdue.edu](mailto:sbond@purdue.edu), 496-1985 or Sue Grimes, [sgrimes@purdue.edu](mailto:sgrimes@purdue.edu), 494-5858

Purdue faculty and staff who will be writing grant proposals can learn how to partner with key education and outreach programs on the Purdue campus. Expo 2014 includes extended time to visit booths and talk with program representatives about tailoring initiatives and resources to your particular grant proposal.

### Quest for Equality Exhibit and The Deans' Bible Book Launch

- » **When** March 19, 5 - 6:30 p.m.
- » **Where** Virginia Kelly Karnes Archives and Special Collections Research Center, 4th Floor HSSE Library, Stewart Center

Purdue University Libraries invites you to celebrate the leadership, advocacy, and commitment of five indomitable Purdue women.



[www.purdue.edu/discoverypark/dls/](http://www.purdue.edu/discoverypark/dls/)

### Just Sustainabilities: Re-Imagining E/Quality, Living within Limits

- » **When** April 24, 4:30 p.m.
- » **Where** Fowler Hall, Stewart Center
- » **Contact** Cindy Fate, [cindy@purdue.edu](mailto:cindy@purdue.edu), 494-5146
- » **Website** [www.purdue.edu/discoverypark/events/view.php?id=1518](http://www.purdue.edu/discoverypark/events/view.php?id=1518)

Julian Agyeman, Professor, Urban and Environmental Policy and Planning at Tufts University presents the concept of 'just sustainability' — the full integration of social justice and sustainability.

### Leveraging OVPR and Purdue-wide Resources for Large, Interdisciplinary Proposals

- » **When** March 25, 11:30 a.m. - 1p.m.
- » **Where** Stewart Center, Room 310
- » **Contact** Sue Grimes, [sgrimes@purdue.edu](mailto:sgrimes@purdue.edu), 494-5858
- » **Website** [www.purdue.edu/research/vpr/rschdev/events.php](http://www.purdue.edu/research/vpr/rschdev/events.php)

This workshop will provide an overview of support and resources available to Purdue faculty when preparing large, interdisciplinary proposals. The presentations will include an overview of support available through the Office of the Vice President including proposal coordination (grant writing), teambuilding, and site visit assistance. The discussion will also cover how resources available through Discovery Park, including facilities and administrative support, can be key to the success of large, interdisciplinary proposals.

Lunch is provided. Registration is required by Thursday, March 20.

## APRIL

### Office of Interdisciplinary Graduate Programs Spring Reception

- » **When** Wednesday, April 2, 2 - 4 p.m.
- » **Where** North and South Ballrooms, Purdue Memorial Union
- » **Contact** [oigp@purdue.edu](mailto:oigp@purdue.edu) or 496-1016
- » **Website** [www.gradschool.purdue.edu/oigp/calendar/reception.cfm](http://www.gradschool.purdue.edu/oigp/calendar/reception.cfm)

The Office of Interdisciplinary Graduate Programs (OIGP) is hosting a reception in celebration of interdisciplinary graduate student research. A diverse array of student research posters and multimedia presentations will be featured from across Purdue's 15 interdisciplinary graduate programs. A brief program will begin at 3:00 p.m., including awards presentation and a keynote address. Refreshments will be served. Please RSVP: [oigp@purdue.edu](mailto:oigp@purdue.edu).



## Discovery Park Student Poster Session and Reception

- » **When** April 3, 4:30 - 6 p.m.
- » **Where** Hall for Discovery and Learning Research, First Floor Atrium
- » **Contact** Laura Warner, [learningcenter@purdue.edu](mailto:learningcenter@purdue.edu), 494-4555
- » **Website** [www.purdue.edu/discoverypark/learningcenter/studentevent.php](http://www.purdue.edu/discoverypark/learningcenter/studentevent.php)

This poster session and reception will highlight the achievements of undergraduate students in interdisciplinary internship programs affiliated with Discovery Park. Marietta Harrison, Associate Vice President for Research, is scheduled to speak at 5:30 p.m. Nearly 100 Purdue undergraduate students represent these programs: the Cancer Prevention Internship Program, Discovery Park Undergraduate Research Internship, Interns for Indiana, Louis Stokes Alliance for Minority Participation, and Margo Katherine Wilke Undergraduate Research Internship. The Discovery and Learning Research Center annual event is free and open to the public but registration is required (see website.)

## Envision Center 10-year Anniversary Open House

- » **When** Tuesday, April 15, 1:30 - 3 p.m.; presentation at 2:30 p.m.
- » **Where** Stewart Center, Envision Center, B001, (located off the tunnel between the Stewart Center and the Purdue Memorial Union)
- » **Contact** Jon Wright, [jdwright@purdue.edu](mailto:jdwright@purdue.edu), 494-3165
- » **Website** <http://envision.purdue.edu>

This event will showcase the high-end research visualization center operated by ITaP, the services it offers and its progress and projects over the 10 years since its founding. Envision Center uses a blend of technology and art to enhance research and teaching by graphically representing data and information. It specializes in technology and techniques such as data visualization and analysis; virtual simulation; human-computer interaction; and media creation, including video and animations. To RSVP, please contact Diana Byers by Friday, April 4th at [byersd@purdue.edu](mailto:byersd@purdue.edu) or 496-7888. Please include the name(s) of those attending and note if any special accommodations are required.

## SBIR/STTR Workshop

- » **When** April 16, 9 a.m. - 3 p.m.
- » **Where** Burton D Morgan Center for Entrepreneurship, Room 121
- » **Contact** Bambrah Miller, [bambrah@purdue.edu](mailto:bambrah@purdue.edu)
- » **Website** [www.purdue.edu/discoverypark/entrepreneurship/](http://www.purdue.edu/discoverypark/entrepreneurship/)

The workshop will provide faculty with an overview of the program, participating agencies, and common elements of the SBIR/STTR proposal process (from a strategic perspective). It will include pre-proposal, proposal elements, and proposal tips/techniques designed to improve submission success rates. Lunch is included and seating is limited. Registration is required.

## NSF CAREER Program Overview

- » **When** April 29, 11:30 a.m. - 1 p.m.
- » **Where** Stewart Center, Room 322

This workshop is for untenured faculty in all disciplines who are interested in developing a proposal for the NSF CAREER competition. Registration will open about one month prior to the event. The registration form and updated event information will be available at [www.purdue.edu/research/vpr/rschdev/events.php](http://www.purdue.edu/research/vpr/rschdev/events.php). ■

## Nominations Solicited for the Entrepreneurial Leadership Academy

The Entrepreneurial Leadership Academy, a faculty development opportunity supported by the Burton D. Morgan Center for Entrepreneurship, is accepting faculty nominations from Purdue's colleges and schools for participation in the Entrepreneurial Leadership Academy beginning next Fall 2014. Nomination materials are due **April 18**.

The Entrepreneurial Leadership Academy is a professional development program aimed at mid-career or senior faculty who have entrepreneurial interests.

For more information, contact Candiss Vibbert, Associate Director for Discovery Park Engagement at [vibbert@purdue.edu](mailto:vibbert@purdue.edu) or 494-9404.

## Lilly Day to Encourage New Partnerships

More than 40 Purdue representatives, including faculty members and administrators, visited Eli Lilly and Co. last September for the inaugural Lilly Day with Purdue University.

Designed to deepen relationships between Purdue and Lilly researchers, the event resulted in 10 potential applied technologies projects for Purdue researchers that could be funded through the newly created Lilly Technical Seed Award for Purdue.

"Right now, faculty members are refining their budgets," says **Geanie Umberger**, assistant vice president for research. "If approved, researchers will be given seed funds, and then Lilly administrators will look at their results and see if they will turn into something that could be funded further."

The semiannual Lilly Day is part of Lilly's efforts to deepen relationships with Purdue researchers in order to advance the life sciences industry in Indiana. The next event, to be held at Purdue on May 8, will feature formal presentations and networking opportunities.

Umberger is currently recruiting faculty participants in areas such as industrial pharmacy, chemistry, chemical engineering and materials engineering. If you're interested, contact her at [gumberger@purdue.edu](mailto:gumberger@purdue.edu) or 496-3723. ■

→|| OFFICE OF THE VICE PRESIDENT FOR RESEARCH

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## »» Research Services Directory

- » General Information & Questions; 494-9806
- » Vice President for Research; 494-6209; Richard Buckius, rbuckius@purdue.edu
- » Discovery Park; 496-6625; Alan Rebar, rebar@purdue.edu
- » Research Core Facilities; 496-1938; Jeff Bolin, jtb@purdue.edu
- » Cost Sharing; 494-0702; Mary Millsaps, millsaps@purdue.edu
- » Internal Competitions; 494-4231; Marietta Harrison, harrison@purdue.edu
- » Industry Research and Technology Programs; 494-0743; Geanie Umberger, gumberger@purdue.edu
- » Research Development: Workshops, Competitions; 494-5858; Sue Grimes, sgrimes@purdue.edu
- » Research Development: Proposal Coordination/Writing; 496-1985; Sally Bond, sbond@purdue.edu
- » Research Integrity; 494-3996; Peter Dunn, pedunn@purdue.edu
- » Research Regulatory Compliance; 494-7458; Ianthe Bryant-Gawthrop, ibg@purdue.edu
- » Research Quality Assurance; 496-6653; Michael Szczepanski, mikes@purdue.edu
- » Conflict of Interest; 496-1763; Voichita Dadarlat, voichi@purdue.edu
- » Export Controls; 494-1852; Michael Reckowsky, mreckowsky@purdue.edu
- » Protection of Research Subjects; 496-3824; Howard Zelaznik, hnzela@purdue.edu
- » Human Subjects; 494-5942; Kristine Hershberger, kh@purdue.edu
- » Animals; 494-7206; Lisa Snider, ldsnider@purdue.edu
- » Biohazards; 494-1496; Bob Golden, rwgolden@purdue.edu

### Award Information

- » Sponsored Program Services; 494-1055; www.purdue.edu/sps
- » Proposal Information, Transmittal to Agency; 494-6204; proposal@purdue.edu

### Technology Commercialization

- » Patent & Copyright Information; 588-3475; Elizabeth Hart-Wells, otcip@prf.org

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**Distribution** » *Dimensions of Discovery's* mailing list includes faculty, research scientists and postdoctoral associates, as well as administrators and staff with responsibilities related to sponsored programs. If you would like to be on the mailing list, please email Linda Howell at [lahowell@purdue.edu](mailto:lahowell@purdue.edu) or Pam Burroff-Murr at [burroff@purdue.edu](mailto:burroff@purdue.edu).

*Continued from p. 1*



- » Launching a series of education modules, tablet course packs and online courses, specifically geared for students in grades 5-7 and their teachers, where broad concepts of macro sciences and acoustics are introduced in schools nationwide. This project element, called Your Ecosystem Learning Laboratories, or YELLs, includes research efforts by Pijanowski and fellow Purdue researcher **Dan Shepardson**, a professor of curriculum and instruction and earth, atmospheric and planetary sciences.
- » Creating the iListen website, which is designed to connect YELLs as well as theater and mobile applications. The website will include links to related research, a growing library of soundscape recordings, and other tools for teaching and learning more about the field.
- » Developing a series of applications for mobile devices and other technologies for soundscape recordings and research, with a rollout planned in conjunction with Global Soundscape Day, a 2014 Earth Day event on April 22.

Pijanowski is working with international collaborators and media outlets to encourage citizen researchers to capture up to 1 million natural sound recordings and upload them. The ambitious project will require 10 terabytes of storage for the natural soundscape files collected in a single, 24-hour period on what he is branding Global Soundscape Day.

"The mission is to sonify the Internet with nature's wondrous sounds," Pijanowski said. ■