ARKANSAS asset initiative

ASSETS of Arkansas

FALL 2012

ARKANSAS SCIENCE & TECHNOLOGY AUTHORITY

Advancing the talent and innovation necessary for Arkansas to prosper.

An NSF EPSCoR Project

en·tre·pre·neur

[ahn-truh-pruh-nur] *noun* 1. a person who organizes and manages any enterprise, especially a business, usually with considerable initiative and risk. 2. an employer of productive labor; contractor.

ASU ARKANSAS STATE UNIVERSITY

UNIVERSITY OF ARKANSAS

UA FORT SMITH

PHILANDER SMITH COLLEGE THINKJUSTICE

UALR

UNIVERSITY OF ARKANSAS PINE BLUFF

UCA

What is ASSET Initiative?

The Arkansas ASSET Initiative is a multi-institutional,interdisciplinary, state-wide program. Our current project, ASSET II, is designed to strengthen Arkansas research areas with potential for national significance and with major economic development potential. Our three specialty areas include: plant-based production, solar cell technology, and new power electronics.

The Arkansas ASSET Initiative is part of the National Science Foundation's EPSCoR Program. An integral component of the program is entrepreneurial training, support for commercialization of new technologies, and an educational outreach program that targets the STEM pipeline needed to support the advanced technologies workforce.

P3 ARKANSAS CENTER FOR PLANT POWERED PRODUCTION

GREEN

VICTER Vertically-Integrated Center for Transformative Energy Research

ASSETs of Arkansas

(Editorial Staff)

EXECUTIVE EDITOR

Dr. Gail McClure

SENIOR EDITOR

Marta Collier-Youngblood

CONTRIBUTING WRITERS

Ashley Spurr, Lachan Layton,

Emily Devereux, Alison Brown, Kathy Kirk

GRAPHIC DESIGNERS

Marta Collier-Youngblood & Ashley Spurr

WEBSITE

http://www.arepscor.org

Director's Welcome

With the presidential election behind us and 2013 before us, Americans face an uncertain economic forecast, but have hope for increased growth and prosperity as we enter a new year. Our Arkansas ASSET II (Advancing and Supporting Science, Engineering and Technology) program, a National Science Foundation grant, is entering its third year with our maturing projects, and focusing more on economic impact and sustainability. A number of areas within the ASSET research themes are primed for commercialization. One of this issue's articles, "Entrepreneur's Toolkit" is an excellent resource for all entrepreneurial-minded researchers. This issue also showcases several of our younger entrepreneurs (pg. 35) with ties to our research efforts. As we expand our efforts to enhance the entrepreneurial skills of our students, we anticipate that such successes will increase. Another special focus of this publication is an added emphasis on female engineers and scientists, both those in our projects and those who are advisors to our projects.

Outreach continues to be a strong emphasis with ASSET, and you will find highlighted in this issue information on our current projects and science summer camps offered in 2012, the GREEN Mobile on page 14, and VICTER Power Box on page 18. On page15 read more about the new undergraduate GREEN energy training labs that ASSET is establishing at the University of Arkansas at Fort Smith, Philander Smith College and the University of Arkansas at Pine Bluff and on page 17 there is a description of the ESPCoR-funded Bioinformatics Workshop to occur this coming March.

We congratulate the research successes of P3's Dr. Argelia Lorence with the new $2,660,788 NSF Plant Genome program award and Dr. Carole Cramer's receipt of the Tibbet Award. Finally, we direct your attention to our spotlight on the talented undergraduate and graduate students on pages 10-11 and to note the extraordinary funding success of VICTER undergraduate student, Thomas Rembert.

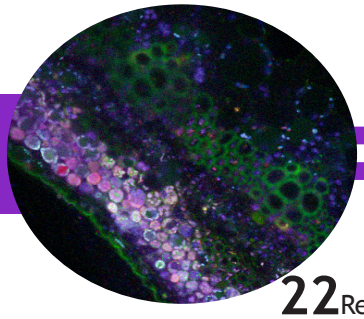
One of the many elements in the mission of the National Science Foundation is to support "the basic research and education that enable advances in many areas including technology-based innovations that spur economic prosperity… NSF integrates research and education to support the development of a world-class scientific and engineering workforce as well as nurture the growth of a scientifically and technologically aware public, one that is able to engage fully in a 21st century life that increasingly relies on technology to meet challenges and grasp opportunities." We hope that, with ASSET resources, our faculty and students will be active participants and even leaders within this innovation frontier.

Sincerely,

Dr. Gail McClure
Vice President Sponsored Projects

Quote from the National Science Foundation Strategic Plan 2011-2016

1. Researchers



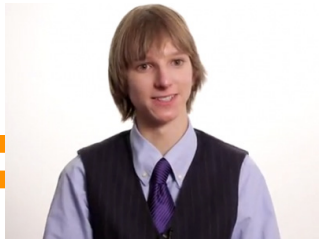
22 Researchers capture high-res micrograph images

ARKANSAS MULTI-USER INSTRUMENT DATABASE

30 New online database catalogs Arkansas' research equipment

2. Students

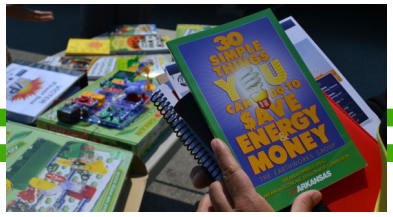
34 Arkansas summer camps get smart



32 Arkansas native creates nuclear fusion in his garage at age 14

3. Teachers

14 GREEN Mobile takes solar lab on the road



18 Education kit trains teachers and helps students

4. Parents & Community

26 Governor's Office endorses STEM Works with implementation in Fall 2012

33 Arkansas State University hosts Mexican Delegation

5. Business

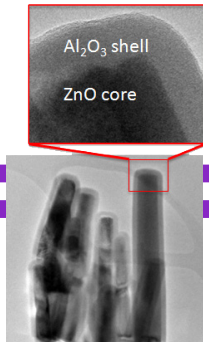
U.S.News STEM Solutions
The National Conference

35 Industry leaders, education experts, and others gather for first annual conference in Dallas, TX

6 Entrepreneurs gain insight into financing, marketing, and growth strategies

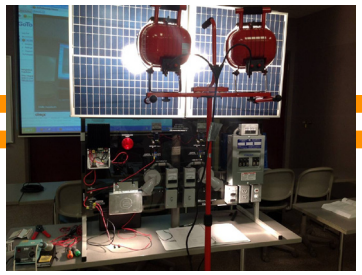
9 NASA Scientist talks about the future of photovoltaics in space

20 GREEN Researchers develop new nano-application



American Council For Medicinally Active Plants

22 P3 hosts international conference



15 New labs offer state-of-the-art solar panel training tools

SCIENCE & ENGINEERING MESSENGERS

37 NSF sponsors Science: Becoming the Messenger Workshop

24 Arkansas students make treasure from trash

19 VICTER takes engineering to the students

16 Teachers get hands-on training at biofuels workshop

17 Bioinformatics Workshop coming to Arkansas

WeSTEM
Women in Economics, Science, Technology, Engineering & Math

8 Arkansas highlights women and girls in STEM

32 Solar Camp Competitions showcase talented teens

Girls of Promise
WOMEN'S FOUNDATION OF ARKANSAS

9 Introducing young girls to STEM careers

Arkansas STEM Coalition
Science • Technology • Engineering • Mathematics

28 The hub of STEM in Arkansas, the Coalition invites businesses, educators, government and community members to make STEM a priority

35 ASSET Students starting their own solar company

Entreprenueur's Tool Kit

Coming up with the capitol to start your own business is never easy. But, here in Arkansas, you need only know where to look. Right now, funding sources are available for technology-based companies. The Arkansas Science & Technology Authority offers Research & Development grants, as well as offering Seed Capital & Technology Development Investments. The Arkansas Women's Business Center is a hub of support and resources for female business owners. The Innovation & Entrepreneurship Center, in Northwest Arkansas, is a collaborative endeavor between University of Arkansas at Fort Smith, the Fort Smith Regional Chamber of Commerce, and the City of Fort Smith. "The NWAEA works closely with the University of Arkansas, allowing the student body to participate in and take advantage of the resources NWAEA's community of entrepreneurs provides."

Capital & Start-up

Once you've thought of a great idea and laid out your business plan, it's time to make your business a reality, but how? More than that, how do you make it successful?

Arkansas resources may surprise you.

* ArkSourceLink * ASBTDC * ARK Challenge * IA * Building Icebergs *

Click to listen to a Free Podcast

STEP 1
THINK OF AWESOME IDEA

STEP 2
IDENTIFY RESOURCES

STEP 3
WRITE A BUSINESS PLAN

STEP 4
GET SUPPORT & FUNDING

SOCIAL MEDIA

The importance of networking cannot be overstated; it is crucial to growing and sustaining your business. Surrounding yourself with other entrepreneurs, you take on their attitudes, savvy business practices and learn about opportunities for funding and collaboration. Few avenues offer such immediate returns on investment as social media outlets like LinkedIn, Facebook and Twitter. These network marketing tools are cost efficient (each are free to join) and can be accessed through any mobile device with an internet connection. This is good for both you and your future patrons. The ability to provide real time updates to your customers and continuously expand your sphere of influence is invaluable.

With organizations like these, market access and promotion are literally at your finger-tips, without any added cost to your bottom line.

facebook

At this point, most grandmothers have a facebook page. If you own a business, but aren't maximizing on this free marketing tool, you are missing out on lots of potential revenue. Marketing dollars are precious. This is an easy way to engage patrons, target your market, and grow your business - for free.

LinkedIn

Linkedin is geared toward working professionals. Essentially, your resume is pulicized for all your "connections" to see. List employment history, education, groups & organizations, awards, interests, and of course your picture.

Elance

Elance showcases freelance professionals in every type of discipline. Promote your own skills, or hire someone else without the fulltime employee committment and accompanying overhead. Want to keep your outsourcing local? You decide your hiring criteria & can search according to what matters to you.

Ultimately, starting and running a successful business comes down to planning and hard work. Resources for Arkansas' entrepreneurial hopefuls can only take a proprietor so far. Individuals must be committed to their concept, but flexible and tenacious enough to roll with punches and make adjustments along the way.

By Ashley Spurr

* Alt.Consulting * Little Rock Score * Conway CoWork * NWAEA * AMS *

WeSTEM

Women in Economics, Science, Technology, Engineering & Math

Close your eyes for a moment and think about what an engineer looks like. Go ahead, try it… Did you picture a Caucasian-American man in a lab coat with thick-rimmed glasses and a pocket protector? If you did, don't feel bad. You are one of many people who have that image stuck in their head. Most engineers by far are male, but steady efforts on the part of the National Science Foundation and many other federal and state-level entities have worked to provide opportunities to those traditionally underrepresented in the engineering workforce, including women. We had a moment to catch up with one such woman, Jessica Keahey, a young engineering practioner in Arkansas who answered the call to become an engineer.

Jessica Keahey

By Ashley Spurr

When did you know engineering was for you? I'm really not sure [laugh]. I came into undergrad with an interest already, and then took interesting classes that challenged me. **What sparked your interest & made you want to go into that field?** Ayn Rand. **What degrees do you hold?** B.S. and M.S. in Civil Engineering. **Once you graduated, did you have difficulty finding a job? Was it in Engineering?** No difficulty at all! Yes, I interned as a graduate student for the company that now employs me (McGoodwin Williams and Yates). They have been patient and understanding throughout my transition. **When you were hired, what about the job surprised you?** I am the only female engineer at my firm. There's not a lot of "corporate structure." And, I realized the saying is true, "GPA gets you your first job, but after that, it's the work you do." My first day was overwhelming, but the further you get from graduation, the more you find yourself in a niche market. **Of the projects you worked on, which was your favorite & why?** Several never came to fruition due to lack of funding. That's something I wasn't taught in school: the variety of project types and what to expect, especially publically funded ones. Local politics play a big role in those. My longest running project is a state-of-the-art, $27 million waste water treatment plant in Batesville. The facility boasts new technology from Norway and will be the first of its kind in Arkansas, not to mention the largest in the United States. It was listed among the top 100 Projects in the U.S. by Vice President Biden. The hardest part of my job involves telling governments how much something will cost…sometimes they experience sticker shock. They are stewards of tax payer dollars after all. **What advice would you give to other young women considering a career in engineering?** Well first, I'd say to anyone- make sure you love it. Second, experience and real world knowledge are much different than book knowledge. Those experiences and acquired skills transfer to many areas of life. And lastly, don't feel ostracized if you're the only female…decide [early on] you're not going to put up with any crap.

▲ Bailey spoke to Engineering Students on April 6th at the University of Arkansas in Fayetteville.

The Arkansas GREEN Research Center invited a member of their External Advisory Board to speak to students about the advantages and opportunities available in the fields of Engineering and Physics.

Dr. Sheila Bailey

shared her industry expertise with University of Arkansas students and spoke on *The Future of Space Photovoltaics*. Dr. Bailey is Senior Research Physicist at the NASA Glenn Research Center in Cleveland, Ohio.

By Ashley Spurr

WeSTEM
Women in Economics, Science, Technology, Engineering & Math
Presents:

Girls of Promise
WOMEN'S FOUNDATION OF ARKANSAS

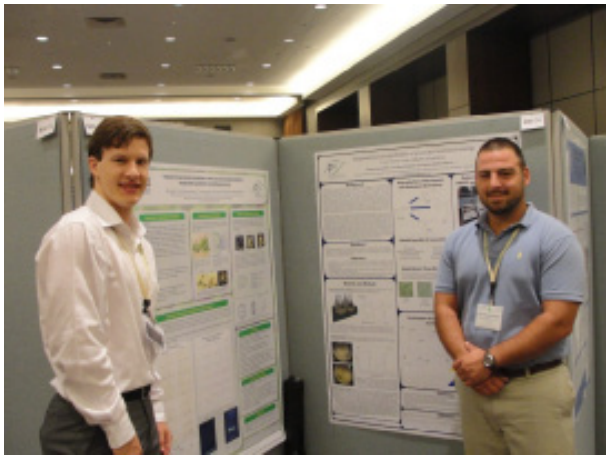
Girls of Promise is a proven, 13-year-old initiative that has introduced almost 4,000 eighth-grade girls across Arkansas to information about careers in areas related to economics, sciences, technology, engineering & math (ESTEM) while giving them the opportunity to meet with women professionals for greater understanding of their own potential and power.

"When girls meet women in successful roles they see that, with hard work and support, careers in these [STEM] fields are attainable and rewarding."

Educators from around the state recommend high-achieving girls to attend a particular Girls of Promise conference for a full day of activities focused on the importance of higher education and the pay-off of hard work. Girls meet others like themselves and realize it's OK to be a bright, motivated girl with big dreams and also meeting and learning from women with amazing careers such as scientists, astronauts, physicians, computer systems engineers, and others.

Courtesy of Women's Foundation of Arkansas

Highlighting ASSET



Zach Marsh (Honors undergraduate student, Biology, ASU, Medina-Bolivar Lab) and Richard Lee Atwill (recent graduate Spring 2012; Chemisty and Biology; ASU, Medina-Bolivar Lab) presented posters at the International Congress on Natural Products Research. The event was sponsored by the American Society of Pharmacognosy. As part of the conference they had the opportunity to visit the Pfizer Plant Research Laboratory and the New York Botanical Garden.

Atwill R, Nopo-Olazabal L, Medina-Bolivar F. 2012. Bioproduction and purification of prenylated resveratrol analogs from hairy root cultures of peanut. International Congress on Natural Products Research. New York, NY. July 29-August 1. (poster)

Marsh Z, Nopo-Olazabal L, Yang T, Joshee N, Medina-Bolivar F. 2012. Induction of specialized metabolites in hairy roots of Scutellaria lateriflora treated with cyclodextrin and methyl jasmonate. International Congress on Natural Products Research. New York, NY. July 29-August 1. (poster)

Thomas Rembert, a VICTER student at the University of Arkansas, received a National Science Foundation Graduate Fellowship, in addition to awards from the Department of Energy Office and the National Defense Science and Engineering Division. These three awards total $95,000 per year! His abstract is to be accepted at the MBE Conference in Japan this September. He is under the mentorship of Drs. Gregory Salamo, Alan Mantooth, and Vasyl Kunets.

Student Researchers

On April 16 2012, Shashank Kulkarni successfully defended his thesis to obtain a MS degree in Chemistry from the Department of Chemistry and Physics at Arkansas State University. His thesis is entitled "Elevating ascorbate content in tomato and studying the role of jasmonates in modulating ascorbate in Arabidopsis". This work funded by the Plant Powered Production Center (to Drs. Fiona Goggin and Argelia Lorence) and a sub-award from the AR-INBRE (to A Lorence), is a collaborative effort between the Lorence Laboratory at Arkansas State University and the Goggin Laboratory at the University of Arkansas Fayetteville. Mr. Kulkarni obtained evidence demonstrating that transient expression of myo-inositol oxygenase in tomato fruits leads to elevated ascorbate content. His work also provided insight about how jasmonates regulate ascorbate content in Arabidopsis. After successfully completing his MS work Shashank has been accepted at the Medicinal Chemistry PhD program at Northeastern University, studies he started this August.

Ningning Zhang attended the training course "Separation and Characterization of Glycoprotein and Glycolipid Oligosaccharides" at the Complex Carbohydrate Research Center of the University of Georgia, Athens, held August 13 -17, 2012. Zhang is starting her first year in the MBS program at Arkansas State University with the Fall 2012 semester, supported by P3 funding. Jianfeng (Jay) Xu and Brett Savary, ASU P3, are co-advisors. Her research project concerns bioproduction of glycoprotein and polysaccharide components of plant cell walls.

(Website for Complex Carbohydrate Research Center, University of Georgia, Athens: http://www.ccrc.uga.edu/training/index.php)

All student highlights provided by their respective research center.

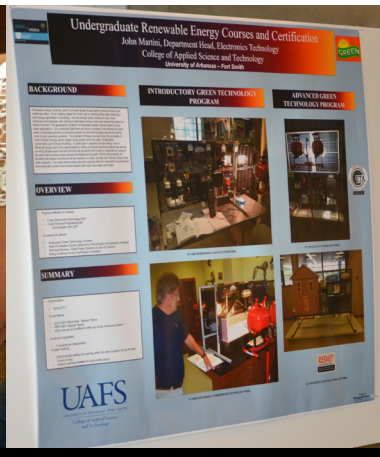
August13-14,2012

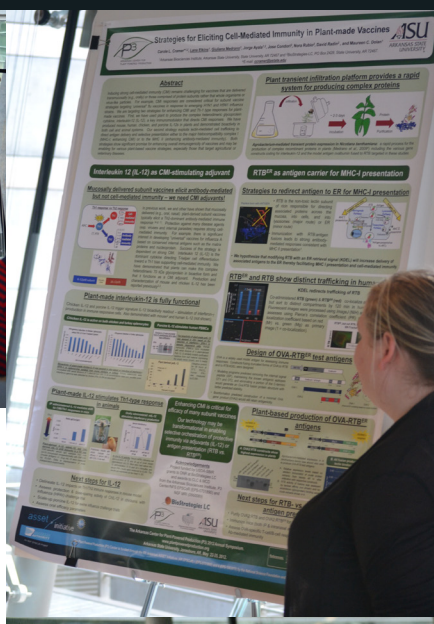
2012 ASSET Annual Meeting

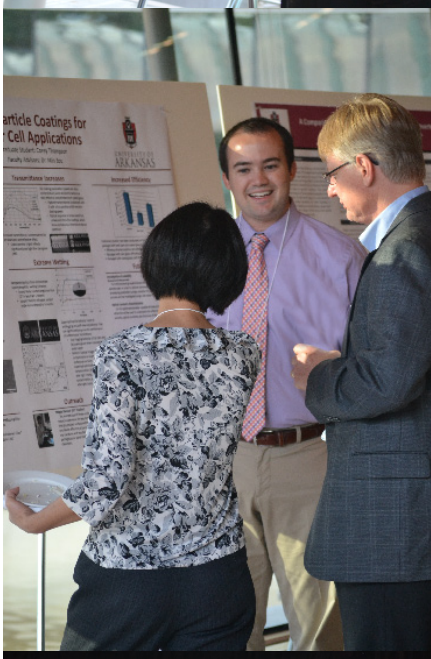
Last year, a team of researchers led by Dr. Gail McClure, the National Science Foundation EPSCoR state director for Arkansas, broke new ground when they hosted the first ASSET Initiative Annual Meeting showcasing a seven-institution partnership to advance biotechnology and solar materials research in Arkansas.

Now, the word is spreading on the cutting edge research taking place in the natural state.

"We are pleased that the hard work of our researchers is drawing the attention of top researchers in the United States and beyond. This lets us know that we are fulfilling the charge given to us by Governor Beebe (AR) and the National Science Foundation through the EPSCoR program," said Dr. McClure.







Over 200 researchers gathered for the annual meeting at the Holiday Inn & Convention Center in Springdale, Arkansas, August 12-14, 2012, to present research progress resulting from the work of three main research groups: Plant-Powered Production (P3), the Vertically-Integrated Center for Transformative Energy Research (VICTER) and the Arkansas Center for Generating Renewable Energy-Efficient Nanoplasmonic Solar Cells (GREEN) research centers as well as a growing educational outreach and diversity program designed to expand and strengthen the K-20 STEM pipeline. This year's meeting was held in conjunction with the CI-TRAIN, Arkansas' current Track II research project.

Research experts traveled from around the country to evaluate the project's progress in year two and provide guidance on how to press toward the mark of commercialization of ASSET's research efforts. These leaders in engineering and bioscience research represent organizations such as the National Renewable Energy Laboratory, Electric Power Research Institute, National Aeronautics and Space Administration's Glenn Research Center, Applied Biotech Institute and the National Science Foundation in addition to a number of leading research institutions.

The three center directors are Dr. Carole Cramer (P3), who specializes in plant-made industrial/pharmaceutical protein research, Dr. Alan Mantooth (VICTER) who specializes in modeling, mixed-signal design and power electronics and Dr. Vasundara Varadan (GREEN), who specializes in metamaterial design and fabrication, light trapping in thin film and nanowire solar cells research. Dr. McClure serves as the research director and principal investigator of the ASSET Initiative project. This statewide project aims to increase research capacity in engineering and biosciences while increasing the STEM-enabled skills of Arkansans at all points along the STEM pipeline.

Year 3 of the ASSET Initiative begins on October 1st. For access to slides from the Year 2 annual meeting click here. For more information on the research and K-12 outreach programs of the ASSET Initiative, an NSF project Administered by the Arkansas Science & Technology Authority, please visit www.arepscor.org.

By Marta Collier

Pictures by Marta Collier & Ashley Spurr

BLAZING THE TRAIL

Pictured is the GREEN Mobile. This statewide, education outreach tool debuted at Conway EcoFest on September 8th, 2012.

Arkansans may soon spot a unique vehicle rolling down the states' highways and byways. The GREEN Mobile is not a common charter bus carrying students from one school event to another. Rather, the refurbished ethanol and solar powered Winnebago will serve as a mobile education unit, designed to bring scientific education to communities and institutions around the state. With on board experiments, this interactive solar laboratory was created to educate children and adults about advancements in solar technology and environmentally friendly energy options. Many teachers will be able to access hands-on, experimental training so they can easily incorporate 21st century science and technology into their lessons. The GREEN Mobile is a creation of the Arkansas GREEN Research Center with the support of the Arkansas Science & Technology Authority, administrators of the ASSET II Initiative, a National Science Foundation EPSCoR program. Funding for the 33-foot mobile lab came from the Arkansas Energy Office, a division of the Arkansas Economic Development Commission. For more information on the education efforts of the GREEN Mobile, contact Arkansas GREEN Research Center.

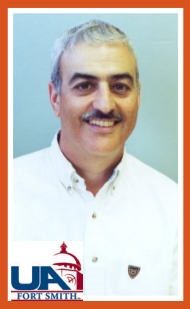
By Ashley Spurr and Marta Collier

Want to see the GREEN Mobile in you town? Click HERE to visit the the GREEN Website and learn more.

Students at the University of Arkansas at Fort Smith tweaked their submissions for GREEN Research Center's exterior design competition.

Access the QR code to watch video of the GREEN Mobile.

3 New Labs Amp-Up Energy Education



Mr. John Martini

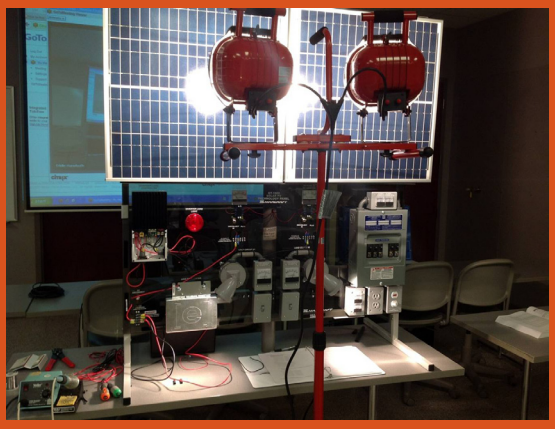
At three Arkansas colleges, GREEN researchers are creating state of the art labs for undergraduates to gain hands-on experience in the constructing, testing and optimization of solar photovoltaic (PV) cells. At the University of Arkansas at Fort Smith, John Martini (Campus Lead for the GREEN Research Center), has established a laboratory that not only trains students, but actually certifies them in solar PV installation. A separate training program certifies student to conduct energy audits. With support from the ASSET Initiative and National Science Foundation funding, Martini purchased several models of Solar PV Technology Panels, giving students access to some of the best available training tools in solar cell technology.

Dr. Nastassia Jones

Dr. Nastassia Jones is a newer member of the GREEN Research Team with big plans for training undergraduates. Jones is a Professor of Biology at Philander Smith College in Little Rock; she currently teaches Environmental Science, Microbiology, Genetics, and will soon add Energy Literacy and Renewable Energy to her course list. The two new courses will be available in Spring of 2013 and later incorporated into a new Alternative Energy Learning Lab, scheduled to come online over the next year. The labs will focus on generating clean electrons and emphasizing the need for sustainable conservation of energy as well as natural resources.

Dr. Seyed Taghavi

The most recent addition to the GREEN Research Group is Dr. Seyed Taghavi, Professor of Electrical Engineering at the University of Arkansas at Pine Bluff (UAPB). His research interests lie with Electronics and Computer Technology. Sometime in the next year, these research interests will fold in to a third GREEN Training Lab at UAPB. Students will construct photovoltaic solar cells then test their creations under various conditions to record and analyze performance of the cells.



In conjunction with these new labs and certification programs, each campus will institute alternative energy courses between the Fall 2012 and Spring 2013. Hands-on training courses and certifications provide immediate, real-world applications that seamlessly integrate into the 21st century job market. These pathways also contribute to ongoing efforts across Arkansas to strengthen its STEM Workforce Pipeline. To find out more information about each of these programs, click here.

By Ashley Spurr

TEACHING TEACHERS ABOUT BIOFUELS

Eight area high school science teachers recently spent time learning about biofuels and doing research at the University of Arkansas at Pine Bluff. Krastina Petrova and Annette Esquibel of Pine Bluff High School and Nina Hubbard of Watson Chapel High School were among educators who participated in the "Biotech-in-a-box: Biofuels" workshop.

"We've been learning about cutting edge research in biofuels and we've been doing hands-on experiments," said Petrova, who teaches 11th grade chemistry as part of the Teach for America program. "This will help me do more hands-on labs with the students and allow me to do more collaborative work with chemistry and biology." Esquibel, who teaches environmental science, is also in the Teach for America program – a national teacher corps of recent college graduates. She said it can be challenging to find experiential ways to teach environmental science. "This is about alternative energy so this is a great fit," Esquibel said. "It's an important subject for kids to understand for the future – especially in Arkansas where we grow these crops and have the potential to generate biofuel."

Hubbard, who teaches chemistry and physics at Watson Chapel, said she enjoyed the workshop's futuristic nature and looks forward to working with her students. "I like it because you are not only learning material but doing experiments in the classroom," she said. "You are also getting students to expand the way they think."

With oil prices often on the rise, interest in biofuel created from plant material has been growing worldwide. The leading raw materials for producing biofuels are corn, sugar and vegetable oils.

The Arkansas Center for Plant Powered Production, or P3 Center conducted the biofuels workshop at UAPB for high school science teachers. The center is a research consortium among five colleges: UAPB, Arkansas State University, University of Arkansas - Fayetteville, University of Arkansas - Little Rock and University of Central Arkansas. It is funded through an agreement awarded by the National Science Foundation and the Arkansas Science and Technology Authority. The partnership is designed to build on Arkansas' strength in agriculture and the food industry.

The workshop is part of the center's outreach efforts. P3 supports Science, Technology, Engineering and Mathematics (STEM) outreach programs for students in grades 6 through 12

"We'll train (the teachers) here and we'll also loan them a kit that they can use in their classrooms," said Dr. Muthusamy Manoharan, associate professor/graduate program coordinator in the UAPB Department of Agriculture.

Shea Harris of Arkansas State University is the P3 outreach coordinator. He describes the kit as a comprehensive teaching module for high school classrooms. "It's about $6,000 worth of equipment they can use in their classroom on a two-week loan," he said. "The box is based off research done in Arkansas."

Manoharon said the goal of the P3 Center is to spur plant-based biotechnology research, professional growth and economic impact in the state. UAPB has received a five-year $720,000 grant. Of those funds, $227,000 has been used to purchase new equipment to assist researchers in plant-based studies.

"The grant is helping us in creating infrastructure, workforce development and professional development of our faculty," Manoharan said. "It's improving our ability to do research."

P3 offers undergraduate summer research internships which target minority students and one-year stipends for master and doctoral students.

- "This grant allows us to get graduate students who will assist in the research and help our graduate program," Manoharan said, adding that "each year; two undergraduate students will be supported through summer internships."UAPB and ASU are also collaborating on a biological research course for college students that focuses on alternative fuels.

By Bobbie Crockett
Extension Specialist, UAPB

Bioinformatics Workshop Fosters Collaborative Research

Arkansas State University announces a National Science Foundation (NSF) award of $99,999 for the project "NSF EPSCoR Workshop in Bioinformatics to Foster Collaborative Research" (Award No. 1239812) with Principle Investigator, Dr. Xiuzhen Huang (Computer Science, ASU and AR P3 Center Researcher), and Co-Principal Investigator, Dr. Gail McClure (Arkansas Science & Technology Authority).

Funds will support a national-level workshop emerging from the current bioinformatics research collaboration and connection between Arkansas researchers and those of the many states and territories of the US. The workshop will bring computational scientists together with life scientists to explore mathematical and computational modeling to solve real-world challenges in life sciences. The main goal of this workshop is to stimulate and foster research collaborations not only among bioinformatists but also between bioinformatists and life science researchers.

The workshop will focus on four rapidly growing areas in bioinformatics, including: next generation sequencing data analysis, protein structure prediction and applications, systems biology, and molecular ecology. The workshop will define and discuss the current research challenges, open problems and exciting research opportunities of these areas, and come up with novel solutions, suggestions and strategies for addressing the key challenges.

This workshop will be planned and led by a truly collaborative steering committee made up of leaders from Arkansas State University, Arkansas Science & Technology Authority, Dartmouth College, Mississippi State University, North Dakota State University, University of Minnesota, University of New Hampshire, University of Rhode Island, University of Tennessee, University of Vermont, and University of Wyoming.

The bioinformatics workshop will be held in Little Rock at the Peabody Hotel and the Clinton Presidential Center March 3-5, 2013. This event is open to the public, with registration details can be found on the workshop website http://bioinformatics.astate.edu/nsfworkshop.php

Please contact Emily Devereux (edevereux@astate.edu).

Provided By Plant Powered Production

JULIE CARRIER Co-Editor of book

Biorefinery Co-Products: Phytochemicals, Primary Metabolites and Value-Added Biomass Processing (Wiley Series in Renewable Resource)

Julie Carrier recently served as co-editor of Biorefinery Co-Products: Phytochemicals, Primary Metabolites and Value-Added Biomass Processing (Wiley Series in Renewable Resource). Chantal Bergeron, Danielle Julie Carrier and Sri Ramaswamy editors. John Wiley & Sons. 2012, 384 pp. Biorefinery Co-Products highlights various co-products that are present in biomass prior to and after processing, describes strategies for their extraction, and presents examples of bioenergy feedstocks that contain high value products.

Topics covered include:

- Bioactive compounds from woody biomass
- Phytochemicals from sugar cane, citrus waste and algae
- Valuable products from corn and other oil seed crops
- Proteins from forages
- Enhancing the value of existing biomass processing stream

For more information about this resource, please visit Wiley Online Library

By Plant Powered Production

VICTER POWER BOX

EDUCATING, ENGAGING

The first VICTER Power Box (VPB) Workshop was held at the University of Central Arkansas (UCA) in Conway, Arkansas in partnership with the UCA STEM Institute on June 26-27, 2012. Dr. Marta D. Collier, Associate Professor, University of Arkansas, Fayetteville and a dynamic team of science/math educators including Megan Hampel, Lorie Huff, Tiffany Kent, and Administrative Coordinator Kathy Kirk joined with Dr. Uma Garimella, Director and Minnietta Ready, Science Specialist for the UCA STEM Institute to facilitate the professional development training. Fourteen teachers from northwest and central Arkansas participated in the training on renewable and sustainable energy projects contained in the VPB. The teachers engaged in hands-on experiences with the VPB as well as presentations by the workshop team on effective classroom strategies for conducting labs, data collection and analysis, critical thinking, inquiry learning and literacy skills development. Collaborative activities were featured as a key element of the workshop to support teachers teaching and learning from each other. Marta G. Collier, Education Outreach Director for the Arkansas ASSET Initiative, shared key information on how teachers could access additional resources to support the work of the VPB as well as other energy and sustainability initiatives geared to increase the awareness and preparation of Arkansas K-12 students for positions in the STEM workforce. All feedback and surveys reflected the positive reception of the kits and encouragement for additional workshops. Since the delivery of the workshop the VPB program has expanded to include areas served by STEM Centers in Conway, Fayetteville, Magnolia, Arkadelphia, Searcy, Monticello, Hot Springs and Little Rock. Additional teacher professional development workshops for the VICTER Power Box will take place in Arkansas Summer 2013 at locations in Hot Springs, Magnolia, Arkadelphia, Monticello and Searcy. For more information on how to access training and materials associated with the VICTER Power Box please contact Marta G. Collier at Marta.Collier@Arkansas.gov and visit the Arkansas Multi-User Instrument Database and Keyword Search "VICTER Power Box" to find the contact nearest you. Click here to view VPB video http://vimeo.com/48606079.

By Marta Collier

2013EVENTS

W.O.W. Demonstrations

FEBRUARY

UAPB Science Day

Dollarway High School

Pine Bluff High School

APRIL

Greenland Middle School

University of Arkansas Delta Middle School

Springdale Middle School

Barker Middle School

MAY

Fayetteville High School

Asbell Elementary UA Visit

Access the QR code to watch video of the RazorCrush Demo.

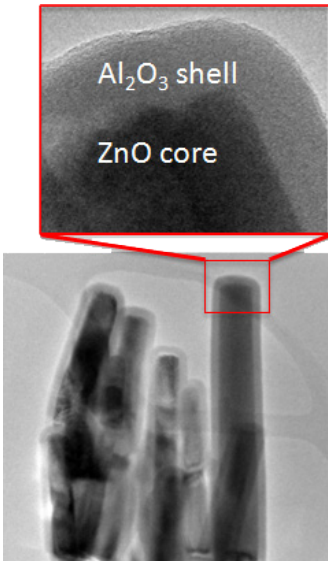
VICTER W.O.W. Mobile Lab & NCREPT

- Thanks to Dr. Bruce Johnson of ASU for the loan of their can crusher over the last year. It has been the highlight of the school demonstrations! The crusher will be returned to the ASU Physics Department at the beginning of the fall semester.
- This summer, Mr. T. A. Walton has worked with 4 George Washington Carver REU students (from Missouri, Illinois and the US Virgin Islands), working a few hours a week in the NCREPT building. They successfully reverse-engineered, redesigned and built a road-ready Faraday Can Crusher for the WOW Mobile Lab (that the students named "Razor Crush"). Two of the students have verbally indicated that this work has caused them to seriously consider graduate studies in Arkansas.
- T. A. Walton and Kim Gillow worked with Dr. Mantooth's Fayetteville High School student intern on NCREPT safety work. Although the student was not able to operate tools or equipment, he was able to assist in the upgrading of safety manuals and tool labeling systems.
- Kim Gillow update: VICTER Campus leads were contacted for recruitment materials to be housed in the W.O.W. Mobile Lab. A Mobile Lab banner has been designed, approved and ordered for use on site with the demonstrations.

By T.A. Walton

New Nanowire Core-Shell Structure Created for Solar Cells

Researchers of the Generating Renewable Energy with Efficient Nanoplasmonic Solar Cells (GREEN) center are successfully creating nanowire core-shell structures using select metal oxides at the University of Arkansas at Little Rock (UALR). Jingbiao Cui, Hye-Won Seo, Tarpin Chen, and Abhijit Bhattacharyya have teamed up, along with their students, and are working to advance solar cell technology. Core-shell nanowires are those with two or more layers, i.e. multilayered nanowire structures. Each nanowire contains a core nanowire on which another material is coated. The coating is called shell. One can coat the nanowires with multi-shell coatings.



This advancement of the solar cells is done through the process of electrochemical growth with Atomic Layer Disposition. Nitrogen Oxide, p-type oxides, and highly conductive Al-doped ZnO (AZO) are being grown as well to help push solar power equipment on the atomic level. These researchers are fabricating ZnO and Al-doped ZnO nanowires (cores) which are n-type semiconductors. They can coat them with another p-type oxide such as Cuprous oxide (Cu2O) or other p-type shell to form nanowire p-n junctions. These nanowires are vertically aligned on a substrate to form a two dimensional arrays.

The nanorods, which make up the wires, commonly have nitrogen deficiencies. These researchers are showing that a specific plasma treatment effectively heals the nanorods. The physical properties of silicon and certain carbon nanostructures are also being studied to see if they could make useful alternative solar cell applications such as the core-shell nanowire arrays are potentially useful for nanowire solar cells, sensors and detectors. Due to the large interface area, a high efficiency for solar cells and high sensitivity for sensors and detectors are expected.

Provided By AR GREEN Center

VICTER RESEARCH UPDATES

NEW MICRO-HALL SENSOR DEVICE

Using the LabVIEW program, an advanced computational tool, Dr. Greg Salamo in collaboration with Dr. Alan Mantooth, has found a way to increase the amount of magnification possible for a Micro-Hall Sensor. This sensor allows for the viewer to see magnetization patterns on a nano-scale. The LabVIEW technology is needed to set up the measurements of the magnetic field in a certain pulse pattern.

INCREASING SOLAR CELL EFFICIENCY

Dr. Greg Salamo has been researching how temperature affects solar cell characteristics. Temperature has been found to be a key element in solar cell efficiency. Through a series of experiments, Salamo has determined a way to better understand the conductivity processes of solar cells with a quantum wire intermediate band. This could also lead to determining a way to increase solar cells efficiency.

Dr. Simon Ang is an electrical engineer at the University of Arkansas, and has been working with "photovoltaic panel glass" otherwise known as solar panels. His research primarily focuses on the outside surface of the solar panel by creating a superhydrophobic (or water repelling) coating. This coating is made of very small chemical bonds that, in the process of repelling water, help to actually clean the panel. Ang is able to study the effectiveness of the self-cleaning surface, the relationship between the surface structures, the adhesion strength of the coating and the amount of light transmitted by utilizing two advanced microscopes: the atomic force microscope and the optical microscope. How well the coating binds to the surface of the glass and how much light is transmitted are determined by the density of the micro-particles that are located in the glass. These particles are affected by the adhesion strength of the coating and how fast the spin speed was when the sample was prepared. He is currently experimenting with how thick the self-cleaning layer needs to be so the maximum amount of light is transmitted.

Provided By VICTER Center

P3 RESEARCH UPDATES

ACMAP ANNUAL MEETING 2012

The AR P3 Center held its AR P3 Center Annual Symposium on May 22, 2012, alongside the American Council for Medicinally Active Plants (ACMAP) Annual Meeting, May 22-24, 2012, on the ASU Jonesboro Campus. Twenty-eight P3 faculty and sixty-one P3 students and post-docs made up half of the ACMAP registrants and participation.

P3 faculty and students presented twelve oral presentations and forty-one poster presentations and was recognized with three presentation awards from ACMAP, including Best Oral: Debbie Vicuna; Best Graduate Poster: Tianhong Yang; Best Undergraduate Poster: Zach Marsh. The P3 management team and P3 TAC members handed out three P3 student poster awards during the poster session, including: Best Undergraduate: Ryne Ramaker (UALR); 1st Place Graduate: Lana Elkins (ASU); 2nd Place Graduate: Cesar Nopo-Olazabal (ASU).

The AR P3 Center was a plenary sponsor of ACMAP 2012. ACMAP 2012 participation was represented by 19 countries and 22 states, and had about 200 in attendance, of which P3 gained phenomenal publicity and networking opportunity. Fabricio Medina-Bolivar (P3 researcher) was ACMAP Host and serves as VP of the ACMAP Board. Please visit the following link to view video footage from the conference, including an interview with Carole Cramer, P3 Director. http://tinyurl.com/bfhdh3y

By Plant Powered Production

World of the MICRO

Story & Images by:
Lacy Nelson and Ken Korth

The addition of a scanning-laser confocal microscope at the University of Arkansas has provided a valuable new tool for researchers to visualize tissues and processes with incredible precision and selectivity. This Nikon 90i upright microscope was obtained as part of the Arkansas P3 Center, funded via the Arkansas ASSET Initiative II by the National Science Foundation –EPSCoR program and the state of Arkansas in 2011. Confocal microscopy has several advantages over conventional microscopy: narrow depth of field, the elimination of image-degrading out-of-focus information, and the ability to collect and stack serial optical sections from thick specimens. This instrument is available to both academic and commercial users. P3 scientists at the University of Arkansas have used the microscope to study the infection process of a pathogenic fungus expressing a jellyfish green fluorescent protein, and the localization of fluorescent tissues in transgenic and non-transgenic plants. In addition, scientists from the Departments of Poultry Science, Biological Sciences, and Engineering have utilized the instrument for their own research studies. Anyone interested in using the instrument should contact Lacy Nelson (ldnelson@uark.edu) for details.

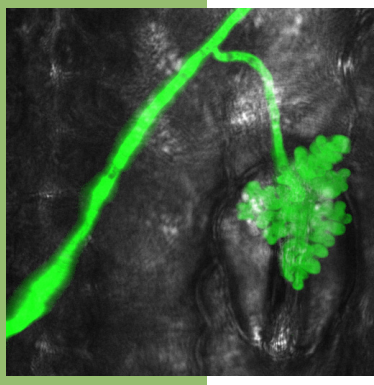


Image 1: This picture shows a transgenic plant pathogenic fungus expressing green fluorescent protein as it grows on the surface of a corn leaf. In green, fungal filaments are clearly seen, including a branch growing toward a leaf opening ("stoma") and a multi-lobed structure ("appressorium") required to infect the leaf (image courtesy of R. Lou Hirsch and Burt Bluhm).

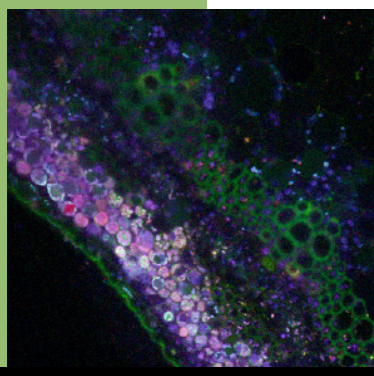


Image 2: The cross-section of a stem from the barrel medic plant, Medicago truncatula, clearly shows the plant vascular tissue in green in the upper right, surrounded by auto-fluorescent cortex cells in purple toward the outside of the stem (image courtesy of Lacy Nelson and Ken Korth).

Arkansas Researchers Use New Techniques to Boost Plant Productivity

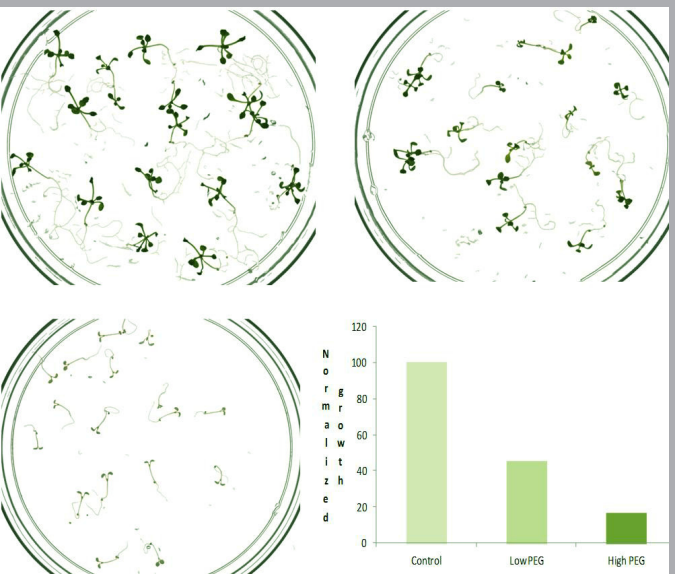
Arkansas Plant-Powered Production (P3) researchers have identified a connection between oxidative stress and the reduction of high-level recombinant plant protein productivity. Scientists in this Set-Points cluster found a way to combat this stressor by applying transgenic and tissue infiltration techniques. Work in this area is overseen by Drs. Maureen Dolan and Argelia Lorence at Arkansas State University.

In Dr. Elizabeth Hood's lab, researchers have used gene-expression analysis (RNA) and identified physical and chemical roadmaps showing how to increase protein storage inside corn embryos.

Another innovative technique has been developed in the Dolan, Xu and Cramer research groups to increase the amount of recombinant protein a plant can generate. The technique is a chemical process that uses a sort of super strong chain link called "hydroxyproline-linked-0-glycosylation" to increase both plant cell and whole plant bioproduction.

Much of this work was made possible by the acquisition of the LemnaTec Scanalyzer phenotyping system, a major piece of the multi-user research equipment investment of the Arkansas ASSET Initiative.

For more information on the Plant-Powered Production research center and Arkansas' Multi-User Instrumentation please visit www.plantpoweredproduction.com and www.amuidb.org.

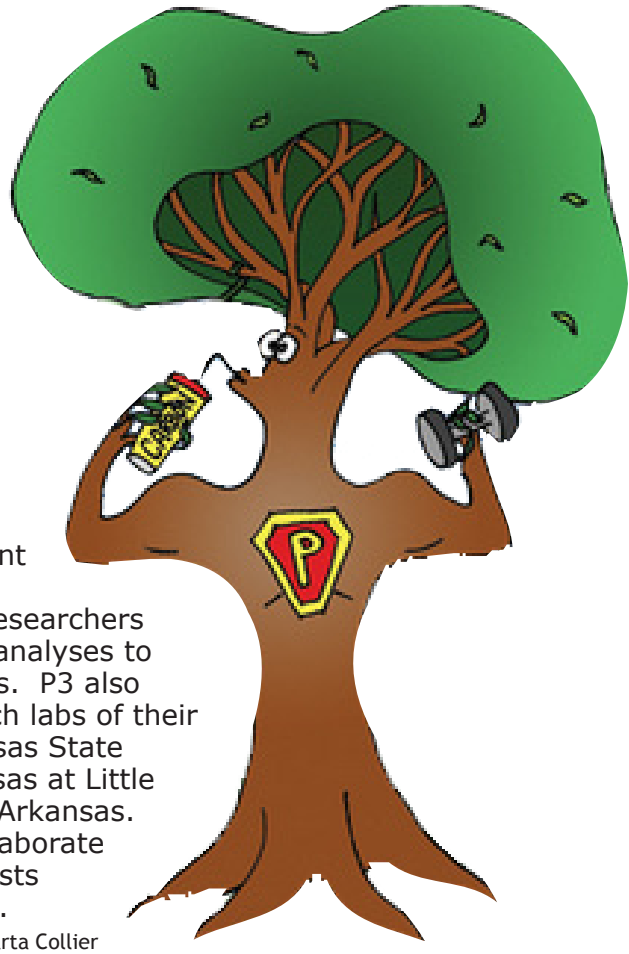


By Plant Powered Production and Marta Collier

Scientists Investigate Ways to Boost Plant Defense Capabilities

What happens if you cannot run away from a potential threat? You would have to find a way to stand and defend yourself, right? Well, that is exactly what plants have to do on a daily basis. Researchers with the Arkansas Plant-Powered Production (P3) Metabolomics cluster are gearing up to find new ways to help plants protect themselves from harmful external threats.

At the University of Arkansas at Little Rock, a team led by Dr. Stephen Grace is applying bioinformatics approaches to better understand big LC-MS phytochemical data sets using an advanced computer program designed by P3 student and faculty researchers called NeedleFinder. Once this group has isolated findings from their datasets, they will be able to hand their results off to their P3 research teammates 200 miles to the northwest at the University of Arkansas, Fayetteville. Under the direction of Dr. Julie Carrier, biomass deconstruction experiments will provide an experimental dimension to validate key findings from NeedleFinder. The third point on this collaborative research team can be found at Arkansas State University in Jonesboro, where in Dr. Fabricio Medina-Bolivar's lab researchers are employing metabolic engineering approaches and transcription analyses to create larger quantities of "defense" compounds found in hairy roots. P3 also makes a concerted effort to recruit student workers into the research labs of their various clusters from all P3 partner campuses which include: Arkansas State University; University of Arkansas, Fayetteville; University of Arkansas at Little Rock; University of Arkansas at Pine Bluff and University of Central Arkansas. P3 attributes much of its success to the willingness of faculty to collaborate across disciplines and institutions leveraging the expertise of scientists from many locations to advance science that matters close to home.



By Plant Powered Production and Marta Collier

Arkansas Vehicles Go *Electric*

The need for a national movement in advancing renewable energies is apparent in recent White House Initiatives. The federal government has taken notice of the need for more environmentally friendly cars and other equipment. The White House has taken the initiative to promote the use of electric vehicles in city government. An excerpt from the Recovery Act: the Transformation of America's Transportation Sector says that "investments in batteries alone should help lower the cost of some electric car batteries by nearly 70 percent before the end of 2015. Thanks in part to investments, U.S. factories will be able to produce batteries and components to support up to 500,000 electric-drive vehicles annually by 2015."

Arkansas high school students are building the vehicles of tomorrow. One school leading the charge in the advancement of engineering innovation is Hot Springs High School with their solar-electric powered vehicle. Michael Vincent, EAST Lab facilitator for Hot Springs High School, has overseen the student-led construction of a solar-electric powered car that has recently been featured on Today's THV (Little Rock) in March 2012. This all electric vehicle does not require any fossil fuels and will have zero emissions. The EAST students expressed interest in this solar science project when they found a broken down go-cart on the Hot Springs High School campus. They petitioned Vincent with a wide range of ideas that might enable them to drive the go-cart. Vincent says, "I was surprised to read so many inventive ideas ranging from improving gear ratios and entering an electric car student competition, to creating a solar powered vehicle. Seeing the enthusiasm in the kids to engage in a hands-on project like this, I looked for funds to obtain materials needed for the project." Vincent applied to the Arkansas Science & Technology Authority (Authority) for a classroom enhancement grant funded through a Winthrop Rockefeller Foundation STEM Empowerment Project.

The students have been exposed to certain materials they would not normally have access to such as construction tools, certain chemicals, solar cell materials, and current inverters. David Bird, an EAST lab student, comments "The things we have done to make this go-kart more than a mere vision of our imagination but by making it physically come to life before us, has given me a sense of accomplishment that I don't think I would get otherwise." Students had active learning in the subjects of basic physics, chemistry, engineering (especially electrical and mechanical), manufacturing, and formula manipulation.

The project is part of the Science Unit for Physical Science and included an EAST lab facilitator, a physics and science teacher, and a mathematics teacher. Many community businesses also played a larger role in helping with the development of the car. The students were introduced to the process of converting sunlight to energy using photovoltaic cells through this project. They have gained a greater understanding of the importance of solar power to the environment, how photons interact with atoms, how to "collect" electrons to make electricity, and how a single crystal silicon cell accepts light. Alex Vinson says "I think that the community support we had on this project was amazing because without the support of the community this project would not have been possible." Due to these eager investments of local businesses, the program had budget savings that the students used to enhance the car. Recent updates on this project include that the car has been successfully made, includes a sound system, and it is a

Zero-emissions, electric car constructed by University of Arkansas Fort Smith Professor of Electrical Engineering, Dr. Kevin Lewelling, along with the help of his student, Kevin Tran.

(Opposite Page) The Hot Springs High School EAST Lab refurbished a go-cart into a solar-powered vehicle.

"Without the support of the community this project would not have been possible..."

Wi-Fi hotspot for approximately 300 yards. All of the enhancements are completely solar powered.

The interest in Electrical Vehicle Projects is not limited to Arkansas high schools. On the collegiate level, two University of Arkansas system schools are working on their own electrical vehicle projects. The University of Arkansas at Fort Smith has built a zero emissions car that does not require fossil fuels and the University of Arkansas – Fayetteville has for the past few years offered a solar boat summer program which introduces high school students to solar power technology. Both of these universities have made noticeable achievements such as Fort Smith's 2500 pound solar vehicle runs on marine–grade batteries. At the Razorback Solar Boat Camp, students learn how to effectively create solar powered vehicles and then test how well they perform in a competition. The Authority, through the Winthrop Rockefeller STEM Empowerment grant, helped to fund the Solar Boat competition by contributing a total amount of $35,000.00 over the course of three years. These programs successfully teach students the importance of alternative energy methods that will hopefully be used in the future. Also, the Authority, through an ASSET Initiative NSF RII Track 1 grant, has funded a SURF award in the amount of $2,700.00 to Kevin Tran. Tran is a student at the University of Arkansas art Fort Smith researching electrical vehicles.

Electric vehicles and charging stations are becoming more frequent occurences in Arkansas. In Little Rock there are two charging stations at 900 W. Capitol, one station at the Clinton School, and the University of Arkansas at Little Rock has talked about installing a station at the school. The City of Fayetteville and several other cities have also purchased electric vehicles for official business about town.

By Lachan Layton, Ashley Spurr and Marta Collier

Arkansas STEM Works

Governor's Workforce Cabinet Announces STEM Works Schools
LITTLE ROCK - The Governor's Workforce Cabinet today announces that 15 districts throughout the state and one technical center have been chosen as the first participants in the administration's STEM Works initiative.

"We're proud that a diverse range of schools applied to participate in our STEM Works program," Governor Mike Beebe said. "In Arkansas, education and economic development must work hand in hand to build the strong workforce so important to our state's future prosperity. These schools will be leaders in this work."

STEM is short for "Science, Technology, Engineering and Math." Governor Beebe on Aug. 16, 2011, announced the creation of STEM Works with the aim of educating more K-12 students in the fields that need the most qualified workers and have the most potential for expanding the state's economy. Another project goal is equipping Arkansas colleges with the tools they need to better educate future K-12 teachers in these core subjects.

The districts and the tech center were designated by the cabinet to participate either in Project Lead the Way or the New Tech Network. The New Tech high school model integrates STEM education and extensive project-based learning throughout the curriculum. Project Lead the Way includes several introductory courses in engineering or biomedical sciences that show how basic concepts taught in the classroom are used in the work world.

"Our goal was to have 10 STEM Works schools for the 2012-2013 school year and we've surpassed that," said Arkansas Education Commissioner Dr. Tom Kimbrell. "We'll all work together to make sure these schools are successful and can be models for schools seeking to participate in the future."

Excerpt from Arkansas STEM Works

Arkansas UTeach

- UTeach Arkansas is modeled after a successful program and has participating campuses across the nation.
- UTeach introduces undergraduate Science, Technology, Engineering and/or Math (STEM) majors to secondary-school teaching by recruiting students and providing an initial course at no charge.
- Universities offering UTeach – 2012 Implementation
    - University of Arkansas, Fayetteville
    - University of Arkansas at Little Rock
    - University of Central Arkansas

Joining Project Lead the Way are Gravette, Jonesboro, Prairie Grove, Riverview, and Star City. The Northark Technical Center, which serves 14 districts in northern Arkansas, was also chosen for Project Lead the Way.

Named as New Tech districts were Arkadelphia, Dumas, El Dorado, Highland, Hope, Marked Tree, Riverview (which was also chosen for Project Lead the Way), Russellville and Van Buren.

Lincoln and Cross County began participating in New Tech this school year, and they were also awarded grants by the cabinet as part of STEM Works. On Monday, Cross County and Lincoln each were granted conversion charters by the State Board of Education, which will help provide flexibility to operate New Tech programs.

New Tech schools will receive $150,000 each while Lincoln and Cross County, as existing New Tech schools, will each receive $75,000. Project Lead the Way schools will each receive varying amounts up to about $95,000, depending on need.

"As a state, we have a moral obligation to all of our students - not just the top 5 or 10 percent - to offer the STEM skills that will be required in every 21st-century career," said Arkansas Department of Career Education Director William L. "Bill" Walker, Jr. "STEM Works will expand the opportunities for more students to explore careers in STEM fields."

For more information please visit the Arkansas STEM Works site at http://tinyurl.com/c3pus38

Click on these images to view Youtube videos about Arkansas' STEM Works Initiative.

Arkansas Steps Up STEM

These days, STEM is everywhere. Parents, teachers, pundits, business leaders, legislators, even the president– they're all talking about this term. Most people would agree that science, technology, engineering and mathematics are all important, but what makes STEM so crucial now? The answer requires a comprehensive perspective on our society: past, present and future.

The industrial and technological boom of the twentieth century propelled our country to a level of unprecedented economic prosperity. The generation born after WWII would later be inspired by the largest technological undertaking in human history: sending a man into space; and not only that, they were going to put him on the moon. The space race of the 1960's gave college-bound baby-boomers plenty to dream about, and no doubt influenced some to pursue STEM careers.

Today, this group of experienced engineers, mathematicians, scientists and technology innovators are about to retire. This declining workforce will leave behind a gaping hole in the employment market, as well as our experiential resource base. So, herein lies the task before us – before the pioneers retire, we must replenish the workforce with highly competent, talented STEM workers. The silver lining to this mission is that STEM fields afford numerous benefits to individuals pursuing them. Not only are STEM careers rewarding, they are challenging. Constantly progressing, STEM jobs require curiosity and creativity. They drive our economy and generate fascinating discoveries.

The Commerce Department estimates a 17% growth of STEM related employment from 2008-2018, that translates into about 5 million jobs! Another major, practical selling point is that STEM careers pay more than non-STEM careers, on average 26% more. Most require degrees, and many fields require advanced certifications or graduate degrees. STEM professions seem to experience less unemployment than non-STEM vocations. There's a lot to be done in the education and preparation of STEM leaders, but for Arkansas and the country to remain competitive in the globalized world, filling these high-skilled positions should be a priority for everyone.

Here's where public-private partnerships come into play.

Established in 2007, the Arkansas STEM Coalition provides the central hub necessary for collaboration among educators, businesses, governmental and non-governmental organizations to advance the cause of STEM. Their goal, first and foremost is STEM advocacy. Influencing public policy toward STEM education, disseminating information and facilitating discussion among community members & leaders are all encompassed by the work of the STEM Coalition. Members meet quarterly to hear about current projects, discuss success strategies, and network for STEM promotion & support.

Businesses can share with educators what skills students need to be hired. Government and educators can work toward collaborative revisions in education policy.

Ever since people developed tools to hunt smarter and grow easier, we have been a species defined by technologically. The tools now powering and organizing our lives are simply applications of our scientific, mathematical, and engineering knowledge. They are, in fact, extensions of us and our creativity.

By Ashley Spurr

www.arkansasstemcoalition.com

at&t

molex®

IBM®

Power Technology Incorporated
Putting the "custom" back in "customer"

swn
Southwestern Energy®

DASSAULT FALCON

BIOVENTURES INVESTORS

THANKS to these Arkansas businesses for making **STEM** education a priority

ARKANSAS MULTI-USER INSTRUMENT DATABASE

Arkansas has one of the best kept secrets in the nation, our university-based research. This is a secret we are more than happy to spill by inviting more academic collaborations with research colleagues both foreign and domestic. Placed strategically around the state are significant resources designed to expand the Natural State's research infrastructure. Just as Arkansas' geographic location makes the state a transportation and logistics hub for the nation's trucking enterprise, Arkansas also offers researchers access to significant research tools within driving distance for fueling innovation and technology. The Arkansas Multi-User Instrument Database (AMUIDB) was commissioned as an outreach project of the ASSET Initiative and launched July 1, 2012, as an online tool to aid researchers in locating and scheduling the use of instrumentation needed for cutting edge research in renewable energy, advanced power grid design and plant biotechnology.

This database provides information on multi-user research and educational equipment housed among 11 educational institutions across the state, including: Arkansas School for Mathematics, Sciences & the Arts, Arkansas State University, Henderson State University, Philander Smith College, Southern Arkansas University, University of Arkansas, University of Arkansas at Fort Smith, University of Arkansas at Little Rock, University of Arkansas at Monticello, University of Arkansas at Pine Bluff, and University of Central Arkansas. Researchers and educators can reference this site to find highly specialized tools for conducting thin film deposition, quantum efficiency and electron beam lithography experiments in addition to several educational resource kits designed to integrate our ASSET research themes into Arkansas' K-12 classrooms. The AMUIDB allows users to quickly identify the equipment's location and specific uses, as well as who to contact to arrange use of the equipment for one stop research collaboration shopping. Having effective tools at your disposal to enhance learning is a key part of Arkansas' strategy for improving STEM education. Arkansans, and those wishing to partner

continued p.30

Thin Film Deposition

ASSET Initiaitve strives to make multi-user instruments accessible to researchers statewide.

with our researchers and educators, can now locate and utilize equipment previously unavailable to them unlocking potential for greater expansion of knowledge and its applications.

To learn more, visit www.amuidb.org.

Story by Marta Collier

Arkansas Research & Technology Park works to stimulate Arkansas' knowledge-based economy through education and business partnerships.

Arkansas State University's Center for Digital Initiatives uses virtual environments to enhance learning.

Arkansas Economic Development Commission works to help commercialize business ideas that come from research centers.

BiologicsMD

Technology Transfer Assistance Grant Program

Purpose
The Technology Transfer Assistance Grant (TTAG) Program assists Arkansas' enterprises in developing or improving products or processes through the transfer of technical solutions to technology-based, industry-driven problems, thus enhancing that enterprise's market competitiveness.

Program Description
The Arkansas Science & Technology Authority provides limited financial support for the transfer and deployment of innovative technology. The Authority will fund up to $3,750 of costs associated with transferring new or existing technology from a qualified applicant -- such as a public or private enterprise, laboratory, college or university -- to an enterprise based in Arkansas. Up to $5,000 of total project costs will be considered, with the first $2,500 funded by the Authority; the remaining $2,500 is cost-shared equally (50:50) between the Authority and the enterprise. Each enterprise is eligible to receive assistance for two technology transfer projects per year. Projects are evaluated on a competitive basis.

Eligible Users
The Authority defines eligibility as broadly as possible to encourage submissions that reflect the greatest potential for project success. Qualified eligible applicants include one or more technology transfer resource providers who possess or have the capability to locate innovative technology to transfer to a specific Arkansas-based enterprise.
For more information on how to access this program contact Dr. Steve Stanley at Steve.Stanley@Arkansas.gov.

ASSET Impacts

SOLAR BOAT WINNERS

Students from Fouke and Foreman High School bring home bright ideas.

Pictures by Texarkana Gazette

Arkansas native, **Taylor Wilson** opened the APSRC Fall Conference. Taylor is the youngest person in the world to create Nuclear Fusion— in his garage at age 14! He also developed a radiation detector for the U.S. Department of Homeland Security. Taylor is passionate about science education and excited about speaking to Arkansas educators! www.apsrc.net

Argelia Lorence (P3) and four other scientists receive NSF-Plant Genome $2,066,788.00 Research Award.

P3 faculty member receives prestigious Tibbetts Award

Arkansas State University's **Dr. Carole Cramer**, a professor in the Department of Biological Sciences and College of Agriculture and Technology, and Dr. David Radin, the former Commercial Innovation Director of the Arkansas Biosciences Institute (ABI) on the ASU campus, have been awarded the prestigious Tibbetts Award by the U.S. Small Business Association (SBA) in Washington, D.C., for their work with BioStrategies, LC. Click here to read more.

Querétaro, Mexico Delegation visits Jonesboro for talks on ASU sister-school

The governor of the State of Querétaro, Mexico, and a group of government officials and businessmen toured Arkansas State University and Jonesboro over the weekend of September 26th. Governor Jose Eduardo Calzada Rovirosa led a delegation that included Querétaro's secretary of education, General Director of Science and Technology, along with the General Director of the Association for the Advancement of Education in Mexico (AIEM) and the president of the private conglomerate, GRUPO PROYECTOS, whose representatives also visited Jonesboro last May as a part of the exploratory process.

During a weekend of activities, the Mexican delegation participated in discussions with Chancellor Hudson and university officials regarding an initiative that could perhaps result in Arkansas State University establishing a sister campus in Mexico. Multi-national corporations such as Bombardier Aerospace, Samsung Electronics, Colgate-Palmolive, General Electric, New Holland, Proctor & Gamble, and Nestle' have located in Querétaro and moved top level executives there. The international business presence has led private sector representatives to explore the expansion of educational opportunities for all citizens of Mexico in the form of an "American-style" university. They have found strong support from Governor Calzada, who has identified enhancing educational access as a cornerstone of his administration. "ASU has an unprecedented opportunity for global leadership and unmatched access to the rapidly growing, increasingly affluent, and academically prepared Mexican higher education market," explained Dr. Hudson. "We now have reached a major juncture in the due diligence of this project that, if fully realized as a sister campus operation in Querétaro, could ultimately transform the trajectory of higher education in Mexico and position Arkansas State as a leader in innovative global education delivery."

According to Chancellor Hudson, if established, the sister campus in Mexico would align with the university's globalization mission, provide ASU students, faculty and staff with collaborative research and exchange opportunities, and elevate Arkansas State's standing in the important perceptual evaluations among peers. Recruitment of U.S. students who are seeking international engagement as part of their academic career could also be enhanced. Any campus in Mexico would be completely self-supporting financially and generate revenue for ASU-Jonesboro. ASU would own no assets; rather, it would install an academic program in facilities owned by a Mexican foundation, with all initial expenses underwritten by local investors. This partnership would provide ASU access to a burgeoning market of qualified students. "A campus in Queretaro will give A-State a major opportunity to improve the university's outreach," commented Dr. Lynita Cooksey, interim vice chancellor and provost. **"Access to new internships and exchange activities for Jonesboro students and faculty will be invaluable, and would not be possible without this partnership."**

While in Jonesboro, Governor Calzada will be presented a "key to the city" from a representative of Mayor Harold Perrin's office during a welcoming meeting with city officials and Jonesboro Regional Chamber of Commerce representatives. Arkansas Gov. Mike Beebe attended a reception and dinner with the visitors Friday evening. The distinguished guests got a full tour of the ASU-Jonesboro campus Saturday morning, and then participated in the annual Legislative Day luncheon and reception at the Chancellor's Residence.

Excerpt from Arkansas State University http://tinyurl.com/d94964x

ARKANSAS CENTER FOR PLANT POWERED PRODUCTION

Dr. Carol Cramer **Dr. Fabricio Medina-Bolivar**

P3 Center & American Society of Plant Biology 2013 Annual Meeting

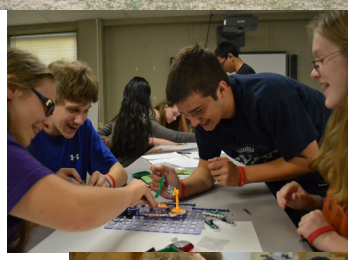
The Arkansas P3 Center will hold the Arkansas P3 Annual Research Symposium 2013 in conjunction with their sponsorship of the 2013 Annual Meeting of the American Society of Plant Biology, Southern Section. The date is set for April 6-8, 2013, to be held in Little Rock, AR. Maria Khodakovskaya, P3 UALR researcher, is serving as host of the ASPB SS meeting.

For updates on the ASPB SS meeting, please visit http://www.ss-aspb.org/.

Updates will also be posted to the Arkansas P3 Center website, www.plantpoweredproduction.org.

Science Summer Camps: What all the SMART kids are doing!

Summer vacation usually brings to mind trips to the beach, camping out with friends and family and most definitely backyard bar-b-ques. Students from across the state of Arkansas combined summer fun with improving their STEM skills as participants at one of seven STEM Academies. The Arkansas ASSET STEM Academies delivered instructive, weeklong experiences in science, technology, engineering and mathematics for over 250 Arkansas students. Each Academy adopted a theme which tied back to an area of active research taking place in Arkansas' current National Science Foundation Track 1 Research Infrastructure Improvement project administered by the Arkansas Science & Technology Authority.



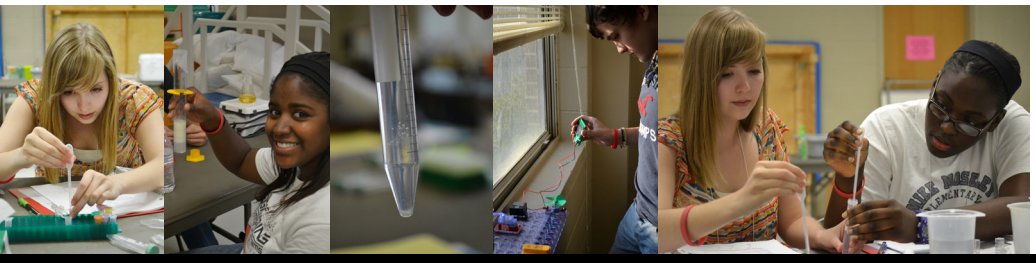
The Central Arkansas Biotechnology STEM (CABS) Academy brought together 24 students, five teachers and a STEM outreach team from around the state led by Marta Collier, Education Outreach Director for the Authority. The group participated in a biotechnology activities where students and teachers learned the finer points of DNA analysis and bio fuels production as well as professional development tips for getting an edge in school and work goals. The Authority teamed up with Arkansas School for Mathematics, Sciences and the Arts (ASMSA), University of Arkansas at Little Rock (UALR) and the University of Central Arkansas (UCA), to offer this intensive, week-long, residential summer camp experience focused on student success both in the lab and in life.

During CABS students grew & isolated bacterial colonies, performed DNA & protein electrophoresis, and created biofuel. All participating students resided on the UCA campus in the STEM Residential College under the watchful eye of the residential camp coordinators. The lead teachers for the academy both hold doctoral degrees in advanced sciences and currently teach at ASMSA residential high school in Hot Springs, AR. Many CABS students elected to attend ASMSA this Fall. CABS participants got a jump start on honing their lab skills while creating and renewing friendships among fellow ASMSA students.

During the evenings, camp facilitators went well beyond organizing entertainment activities. Students engaged in a range of activities designed to provide helpful tools and insights on what it takes to become a STEM major in college and later in the workplace. Potential STEM careers were highlighted as well as sources of research funding and scholarships for students to pursue. Participants were also encouraged to seek out and identifying possible mentors in different STEM areas who can provide guidance on how to navigate the STEM world. Other activities included acronym quiz drills, examining biological specimens in the Jewel E. Moore Nature Reserve, attending the UCA Planetarium show, exploring creative outlets for engineering, and using art to creatively and effectively communicate science. Academies were also offered in Fayetteville, Jonesboro, Arkadelphia, and a special planning grant provided students, teachers and faculty from Southern Arkansas University the opportunity to travel to Fayetteville and participate in the Razorback Solar Boat STEM Academy.

The Arkansas Science & Technology Authority has effectively worked to leverage partnerships to facilitate Summer STEM Academies around the state since 2007 in collaboration with our college, university and informal learning providers. Funding for the past 23 STEM academies was made possible through a STEM Empowerment Grant from the Arkansas-based Winthrop Rockefeller Foundation.

By Ashley Spurr and Marta Collier



Summer STEM Academies Offered in 2012:

DNA Fingerprinting for Science Students
June 11 – 15, 2012 (Day Camp)
Location: Arkansas State University (Jonesboro, Arkansas)
Contact: Dr. Cynthia Miller at camiller@astate.edu or call (870) 897-5124.

Razorback Solar Boat Competition
July 8 – 14, 2012 (Residential)
Professional Development Hours Offered (Scholarships are available)
Location: University of Arkansas (Fayetteville, Arkansas)
Summer Programs Main Page:
http://tinyurl.com/d5k7ed5

Mathematics, Science & Information Technology Summer Academy
July 16 – 20, 2012 (Day Camp)
All sessions were conducted by UCA professors.
http://uca.edu/steminstitute/

Solar Tech - Exploring the Power of the Sun
July 30 – Aug 2, 2012 (Day Camp)
Location: Henderson State University (Arkadelphia, Arkansas)
Betty Ramsey (870) 230-5417
http://www.hsu.edu/SAMSC/

U.S.News STEM Solutions
The National Conference

"We can't just share the [STEM] message. We have to build the programs, the policies, the access to the kinds of experiences students need to go after the jobs that are here now, and the jobs that are going to be here when they get out of high school and college."

– Susan Bodary, Education First

The Arkansas Science & Technology Authority (ASTA) sent four representatives to the 1st Annual U.S. News STEM Solutions Conference June 28-30, 2012. From across the nation government and non-profit representatives, along with experts in education, industry, and STEM disciplines, gathered in Dallas, TX to collaborate on national efforts for strengthening STEM initiatives. Keynote speakers included Dean Kamen, Founder and President of First Robotics, as well as NBA legend, writer, and philanthropist, Kareem Abdul-Jabbar.

Among ASTA's representatives was a young entrepreneur named Douglas Hutchings. Mr. Hutchings is the CEO Silicon Solar Solutions, a startup company based out of the University of Arkansas' College of Engineering. Using original, patent-protected techniques, Silicon Solar Solutions seeks to overcome the two most limiting factors of solar energy expansion in the United States, increasing the generating capacity of solar cells while reducing the cost of their production.

Other Arkansas representatives joined the STEM conversation in Dallas, including: Suzanne Mitchell (STEM Coalition Executive Director), John Chamberlain (STEM Coalition Board Chairman), Betty Ramsey (Henderson State University STEM Center Director), and Tommi Sue Anthony (President of Arkansas AIMS).

By Ashley Spurr

Start Up, Power Up

GREEN student researchsers, Matthew Young (right of Clinton) and Seth Shumate (far right), are starting a new company called Picassolar. These doctoral students are being mentored by Dr. Hameed Naseem, Professor of Electrical Engineering at the University of Arkansas - Fayetteville. Young and Shumate recently attended the Solar Power International Conference in Orland, FL September 10-13th. ASSET Initiative is also working to support entrepreneurship among Arkansas' K12 students through it's Solar Design Competition, scheduled for February 27th-March 1st, 2013 at the annual EAST Initiative Conference.

Arkansas Strengthens Research Collaborations During Living on Earth III Workshop

Researchers from over 10 jurisdictions participated in the third installment of Living on Earth October 23-26, 2012, to advance social-ecological and coupled human-natural systems science. Arkansas nominated three individuals to participate in the workshop: Dr. Alyson Gill, Director of the Center for Digital Initiative at Arkansas State University; Dr. Jackson Cothren, Director of the Center for Advanced Spatial Technologies; and Ms. Marta Collier, Education Outreach Director, Arkansas Science & Technology Authority. The goal of LOE III was to advance collaborative efforts, strengthen research networks, and build capacity in sustainability science. The end product of the meeting was a formal resolution to be forwarded to NSF for the formation of a Social-Ecological System (SES) Network, in some ways similar to the early stages of the Bioinformatics movement.

Drs. Alyson Gill and Jackson Cothren

SES research examines biophysical and social factors that regularly interact in a resilient, sustained manner. This research creates a platform for social and natural scientists to combine the strengths of their respective disciplines to examine problems dealing with people and their environments.

Participants were asked to return to their jurisdictions and compile listings of SES or SES-like researchers who may wish to begin forming collaborative research teams to further SES research and prepare for possible funding opportunities both within and outside of NSF. Participants were also asked to organize a jurisdiction based meeting of interested SES participants to share information learned at LOEIII.

On October 22nd, Collier also delivered a pre-conference outreach presentation at the request of Virgin Islands EPSCoR entitled, "The Great Divide: Bridging Research and Education Outreach". The presentation centered on fostering respect between teachers and researchers, connecting effectively with students, maximizing informal STEM Education Opportunities and making the connection between Assessment and Sustainability. The presentation was broadcast to all three UVI campus locations (St. Thomas, St. Croix and St. John).

By Marta Collier

NSF Science Becoming the Messenger Workshop

The National Science Foundation (NSF) delivered a "Science: Becoming the Messenger," workshop on September 26 & 27, 2012, at the Donaghey Student Center on the campus of the University of Arkansas at Little Rock.

Principal investigators, early career researchers and engineers, graduate students, postdocs, and public information officers from all over Arkansas attended this workshop in order to learn more about effectively communicating science to news media and the general public.

From Wall Street to Main Street, there is a growing interest in science communication and how it can impact future funding and economic development efforts. Scientists are asking how they can more effectively communicate to the media and public--how their knowledge can accurately get across in an increasingly challenging information environment where everyone with a smart phone has the ability to "report" news.

The workshop featured three accomplished communicators and trainers--Emmy award winning television producer Joe Schreiber, former PBS executive Dan Agan, and bestselling science author Chris Mooney--the NSF workshop, "Science: Becoming the Messenger," provides one-stop shopping for those seeking to reach a broader public about their work.

Over the course of day one, participants learned how to craft a message and deliver it to a variety of media outlets. They each had the opportunity to experience live interview training, to develop writing and new media skills, hone their public presentations, and even produce informative videos.

For the ambitious researchers specially selected to participate in the day two portion of the workshop, their messages were developed further and translated into an appropriate medium to be taken public. Some scientists left the workshop with publishable blog posts, op-eds, YouTube videos--and more.

Click the link below to view the Blog released during the workshop highlighting Arkansas ASSET Initiative (http://tinyurl.com/cn3z966)

By Marta Collier