

From the Director:



After two years in our current 3-year RII program, it is extremely encouraging to review the progress of research themes developed under Arkansas ASSET Initiative (Advancing and Supporting Science, Engineering and Technology). Our two research centers, the Plant Powered Production (P3) Center and our Wireless Nanosensors and Systems (WiNS) Center, are working toward sustainability. Each is now well-established with significant increases in individual funding, a well-integrated system of research across the campuses with detailed strategic/business plans for the future. Both have increasing national recognition of the quality of the research accomplished, and growing national and international collaborations. Both Centers are showcased in this edition of the newsletter indicating the progress made toward sustainability in feature stories relating strategic planning and upcoming events that

demonstrate the notoriety and expanding collaborations that are developing.

This edition of ASSETS of Arkansas also features articles on a series of exciting STEM outreach activities provided by our NSF Arkansas ASSET Initiative and the Arkansas Science & Technology Authority. Finally, ASSET is very pleased to offer a very special outreach and communication event in conjunction with our NSF EPSCoR annual state meeting, October 1-2. During this event, a special "Communicating Science" Workshop will be provided by NSF and AAAS on Thursday, October 1, for the first time in the southern region of the U.S.

We think you will find that ASSET Initiative is making a difference in Arkansas. We hope to continue to expand these efforts to move Arkansas forward toward a greater level of national competitiveness and in expansion of our STEM-enabled workforce.

— Gail McClure

Arkansas Receives NSF CI-TRAIN Grant

A collaborative \$6 million grant from the National Science Foundation that will advance the frontiers of knowledge in three core education and research areas has been awarded to the states of Arkansas and West Virginia. The Arkansas share is \$3,370,951. The grant, entitled CI-TRAIN, for Cyberinfrastructure Training, will cyber-enable the workforce, will substantially enhance the supercomputing resources at the Arkansas High Performance Computing Center in support of computational science, including transformative research in nano ferroelectric and ferroic materials, and will apply immersive scientific visualization of multi-scale multi-temporal data to core problems in virtual environments, geosciences, and other areas. Cyber-enabling the workforce will create a capable and substantial workforce in support of 21st century computational research and education.

A key project focus is growing the workforce at multiple levels. A base level of support is provided for Cyberinfrastructure Campus Champions at five universities in Arkansas, and faculty at additional Arkansas universities are already taking steps to participate in the project.

CI Campus Champions will grow the expertise levels and user base of research and teaching faculty, and will enhance undergraduate education and statewide initiatives such as the Arkansas Research and Education Optical Network. CI-TRAIN will provide technology training for staff that provide operational and training support for cyberinfrastructure resources such as supercomputers and high-end visualization tools, and will expand integration with existing technology education programs at more than 200 high and middle schools with 10,000 students. A chief outcome of the CI-TRAIN project will be a model of partnership between information technologists and scientists that can be emulated by other institutions. The project will create a multi-faceted self-renewing workforce that is empowered to apply, sustain, and create cyber-based systems, tools and services over the long term.

The grant has a start date of September 1, 2009 and includes University of Arkansas investigators Amy Apon, Laurent Bellaiche, Fred Limp, and Douglas Spearot, University of Arkansas at Little Rock investigator Srin Ramaswamy, and collaborators at universities across Arkansas and West Virginia.

Upcoming Events

October 1-2, 2009

Arkansas EPSCoR
Annual Meeting
Doubletree Hotel
Little Rock, AR

October 1, 2009

NSF OLPA and AAAS
Workshop
Doubletree Hotel
Little Rock, AR

October 25-30, 2009

P3 Plenary Session at the
IPMB World Conference
St. Louis, MO

January 13-16, 2010

WiNS Symposium on
Nanomedicine and
Biomedical Informatics
Winthrop Rockefeller Institute
Petit Jean Mountain
Morrilton, AR

March 22-24, 2010

Proposed Date for Educational
Outreach Workshop
Peabody Hotel
Little Rock, AR

BEST Robotics Game Days

UALR
Kick-Off Meeting Sept. 12
Mall Day Oct. 17
Competition Oct. 24

ASMSA Hot Springs, AR
Kick-Off Meeting Sept. 19
Mall Day Oct. 17
Competition Oct. 31

EDUCATIONAL OUTREACH

The following outreach events were funded by the Winthrop Rockefeller Foundation (<http://www.wrfoundation.org/>) through the STEM Professional Development and Summer Academy Programs at the Arkansas Science & Technology Authority.

Audubon Student Summer Academy



This summer, students from across central Arkansas participated in the Audubon Summer Academy focusing on the broad field of environmental science and the research aspects of field studies. Led by Audubon Education Director, Mary Smith, the Summer Academy took students through

several different Audubon Center habitats, including glades, succession forests, and wetlands. Within each habitat study, the students were given projects that further reinforced the knowledge gained from the guest speakers throughout the week. The students participated in a forest survey, area mapping, stream analysis, water monitoring, GPS Geocache study, insect trapping, a lichen survey, and a canoe trip on an ox bow lake.

One unique aspect of the program was the Audubon 24/7 Challenge which asked participants to discover more about where they live by learning twenty-four native plants and animals and taking seven steps that make an environmental difference. The steps included volunteer service, water and energy conservation as well as wildlife and resource management and learning more about human impact on the local watershed. The academy increased student interest in both science and the protection of the environment.



Biology Teachers Get Hands-On Training



Eleven high school biology teachers from across the state took part in a 3-day professional development workshop on advanced biotechnology from June 8-10, at the Arkansas School for Mathematics, Sciences, and the Arts in Hot Springs. Applications of Biotechnologies in the

Classroom, taught by ASMSA biology instructors, Dr. Patrycja Krakowiak and Dr. Jon Ruehle, introduced the teachers to 21st century techniques and technology as well as the latest research innovations in the fields of molecular biology, microbiology, and immunology.

The goal of the program was to increase the comfort level of teachers around the state with the latest equipment and technology needed to conduct labs that will prepare their students for a future in fields associated with biotechnology. The teachers participated in five different hands-on laboratory experiments including DNA extraction, gel electrophoresis, antibody immunochemistry, and microbiology isolation and culture.

In addition to the hands-on lab activities, each teacher received a kit with resource materials and lab equipment to use in their own classrooms. Each kit contained a textbook, a lecture book, a biotechnology equipment catalog, and the workshop lab manual as well as a power supply, equipment needed to run electrophoresis, an ELISA kit, a forensic DNA fingerprinting kit, and a microbiology culture kit. The workshop instructors will also be visiting each school's labs to provide support and encourage the usage of the equipment provided by the workshop.



Classroom Teachers Get a Spark for Physics

Electricity and magnetism were the topics of instruction for high school physics teachers for a week long workshop held at the

University of Arkansas at Little Rock. Dr. Al Adams, the instructor for Sparking Interest in High School Physics Laboratories, increased teacher-conceptual understanding of the principles of electricity and magnetism by utilizing 10 laboratory exercises. The content of the exercises included skills from the Arkansas Department of Education Science Frameworks

for Physics. Teachers participated in hands-on laboratory inquiry using state-of-the-art computer measurement systems. The tools for the workshop included Vernier software and a variety of electric, magnetic, and electronic sensors.

Dr. Adams modeled instruction for the inquiry learning environment as the teachers participated as students. One physics teacher was very enthusiastic about taking the lessons back to his students. He credited the value of the workshop experience to Dr. Adams by stating "he's shown us how to not let the technology hide the physics."

Along with receiving lesson plans and supporting material, the participating teachers were awarded funds to purchase lab equipment for their classrooms. The teachers will meet again with Dr. Adams during the school year for follow-up activities.

Physical Science Explored by Middle School Teachers

Twenty middle school math and science teachers from Northeast Arkansas participated in an exploration of Physical Science concepts during the Science and Technology Engaging Middle School Students (STEMSS) initiative held at Crowley's Ridge Education Service Cooperative. The purpose of the summer training was to infuse technology and hands-on inquiry based instruction within the study of Physical Science. Along with instructional strategies, the STEMSS cadre of teachers gained the tools to implement specialized labs in their classrooms. The lab activities will give students the opportunity to solve real world problems and to use new tools in examining scientific principles.



During the workshop, the teachers received software and Vernier probes to use in their classrooms. The workshop encompassed Arkansas education standards in physical science including Matter: Properties and Change, Acids and Bases, Newton's Laws, and Transfer of Energy. The participants obtained the expertise and equipment to implement eight different Physical Science labs in their classrooms. They will also be hired by the cooperative to provide training for additional teachers during 2010 summer professional development. Technology skill-building was also an area of focus for the workshop. The teachers received flip cameras and digital still cameras to use in documenting their units of study. The technology component includes a collaborative website where information and ideas for the labs can be shared throughout the school year.

Teachers Connect Algebra and Science



Harding University held a 2 day workshop for local area math and science teachers that aimed to integrate mathematics and science through data collection and analysis technology. The merging of these two fields using technology as a cornerstone was introduced as a tool for teachers to generate interest and comfort in real world problem solving in middle and high school classrooms. Algebra and Science Connections Through Technology was held at the Center for Math and Science Education

which has a large supply of laboratory equipment that will be available for the teachers to check out during the school year as part of the ongoing activities of the workshop. One of the program's long term goals is to incorporate technology, including graphing calculators, hand-held data collection devices, and flip cameras, into the content of the Arkansas Department of Education Curriculum Frameworks.

In addition to professional development credit, the teachers will earn up to 3 graduate credit hours for their work on workshop projects and follow-up activities. The emphasis on integrating the abstract concepts of math and science to solve tangible problems was a point of enthusiasm for the participants. Michelle Birdsong, a Searcy High School mathematics instructor, praised the program for "relating real world examples to the math I teach in a way the students will understand."

Audubon Arkansas Provides Natural Environment Teacher Training

Audubon Arkansas held a week long professional development workshop for educators across central Arkansas. The STEM Leadership Academy, focused on hands-on integration of field techniques as well as the real life connections to conceptual, classroom-based science. Participants were encouraged to develop collaborative connections with other local teachers in hopes of creating a team of educators dedicated to incorporating science education with the study of the natural environment. The diverse habitats located in the Audubon Center allowed teachers to develop outdoor projects for students in a variety of locations such as glades, forests, wetlands, and oxbow lakes. The workshop also trained teachers in using field equipment including GPS devices for geocache projects, handheld maps for topography and watershed education, water sensors to measure pH and turbidity, and insect traps. The educators were matched with professional mentors for long-term projects to incorporate students into high level, ongoing research. Among the daily presenters were entomologists, ornithologists, and limnologists, who introduced their own experience as field researchers as a tool for educational outreach.

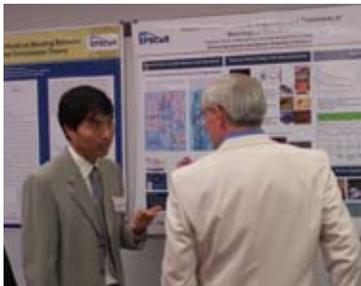
The group held discussions on the current challenges with science education and ways to improve it as well as new ways to bring advanced field techniques into a classroom setting. Teachers were encouraged to collaborate in promoting advanced classes in ecology and environmental sciences both in their own schools and across the state and Audubon Arkansas will provide further training and support for these initiatives.



WiNS UPDATE

WiNS Center Holds Training Workshop and Strategic Planning Event

On July 29-31, 2009, the Arkansas EPSCoR WiNS Center held an Education and Training Workshop focusing on future nanotechnology applications to healthcare at the University of Arkansas, Fayetteville's Engineering Research Center. Packed with hands-on training sessions, instructional lectures, and guest speakers, the three day program introduced the newest techniques and innovations of nanotechnology and potential applications to healthcare. Training instructors taught the participants, ranging from undergraduate students to university faculty researchers, a wide array of subjects including the latest innovations in scanning electron and atomic force microscopy, the testing of antennae using an anechoic chamber, and the design and implementation of wireless sensor networks. Twelve WiNS center scientists presented their research throughout the workshop which showed participants the direct impact of the techniques taught during the program as well as the types of high end research that can be accomplished through interuniversity collaboration. Guest speakers from across the country lent their expertise in the fields of biotechnology, chemistry, and engineering to show the vast diversity of possibilities in applying nanotechnology to healthcare. Keynote speaker, Alexander Kabanov of the University of Nebraska Medical Center, spoke at length about the progress that has been made at his center through collaborations with experienced, well-funded senior researchers mentoring junior researchers.



WiNS Center researchers led nine different training sessions to provide hands-on training with modern nanotechnology techniques and equipment. One major aspect of the program was to better prepare researchers through hands-on training with innovative techniques and new equipment for their careers in

the vast and ever growing fields requiring Nanotechnology, Information Technology and Biotechnology for Healthcare. The workshop also invited further collaboration between WiNS Center researchers at Arkansas State University, University of Arkansas, Fayetteville, and University of Arkansas



at, Little Rock in an attempt to move past theoretical knowledge and onto long term research experience and interdisciplinary applications of new technology. The third day featured a special lecture by Dr. Shannon Davis, Assistant Dean of Engineering, University of Arkansas, entitled "Things No One Tells You Before You Start the Job". This training lecture was designed to prepare researchers entering academic positions for their role in academia as well as research science.

A special breakout session, facilitated by Dr. Jim Fedlt of the UALR Center for Economic Advancement, lead senior leadership along with consultant Dr. Kabanov and other expert guest-collaborators, in strategic planning for sustainability and developing a business plan for the WiNS Center. Dr. Fedlt, a professional facilitator, is working with WiNS leadership to finalize the strategic plan which will be forwarded to ASSET Initiative's External Advisory Board.

The Arkansas WiNS Center is designed to create a collaborative infrastructure for the design of arrays of nanosensors integrated with wireless systems that can be fabricated on specialized, yet low-cost, nanofabrication technology. Dispersing these tiny, low-cost sensors with radio frequency identification systems in various critical locations can enable large-scale monitoring on either a local or national level. This, in turn, leads to unique expertise and capabilities that build capacity, enhance industrial support, and initiate entrepreneurial activities across the state. Besides attracting experts to Arkansas, this center facilitates recruitment of excellent faculty in emerging critical areas, enhances basic research infrastructure in the state, builds a strong workforce to meet the nation's demand, and promotes statewide economic development.

UALR Scientists Reach Out to High School Students

High school students from 11 schools across Arkansas presented research projects in high-level math and science disciplines, the results of their participation in UALR's High School Research Program.

The program pairs high school students with a UALR scientist for one-on-one mentoring in a focused research environment. The mentoring guides the academically high achieving students in selecting future careers in science, technology, engineering, and mathematics.

In addition, the program provides informal peer mentoring by engaging students in faculty research project that allow the participants to establish early contact with college students and professors in specific areas of their interest. The three-week residential experience comes at no cost to the participants.



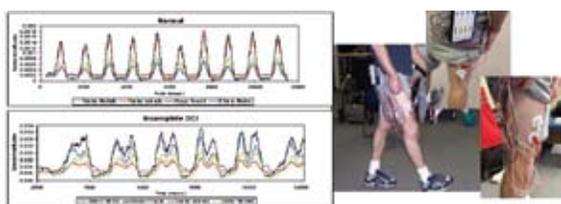
WiNS Researcher Designs Foot Sensor to Aid Gait Analysis

Free joint mobility and appropriate muscle force increases walking efficiency but when there is impairment in walking either due to birth defects or injury, gait analysis is required to diagnose and treat the condition. However, because of the complex nature of human motion and in examining three joints in both limbs simultaneously, gait analysis can be very tedious and difficult and is often inconsistent. Instrumented motion detection has become the logical extension of observational gait analysis.

This led Dr. Shivan Haran, a researcher with the WiNS Center of Arkansas ASSET Initiative at Arkansas State University, to design a foot sensor that can detect the pressure exerted at different points in the sole of foot when a person walks. With the sensor developed, Dr. Haran then needed to classify the signals and create a method for the diagnosis of gait abnormalities.

Dr. Haran attended an extensive one day course conducted by distinguished scientists in the field of neural signal processing. The course, held in Washington DC and sponsored by the Society for Neuroscience, featured established researchers from MIT, Carnegie Mellon University and Cold Spring Harbor laboratory. The researchers lectured and provided hands-on experience in the analytical methods to filter noise from signal and ways to differentiate intricate patterns of activity.

Dr. Haran is collaborating with Dr. Srin Ramaswamy and his WiNS Center research team at the University of Arkansas at Little Rock for further analysis of this data. This training and collaboration will help Dr. Haran make the foot sensor effective in diagnosing of both life-long and sudden impairment in walking.



Normal Gait versus Impaired Gait

Engineering Scholars Program

To help develop a strong pipeline of students who are interested in becoming in engineering majors—and who have the skills and abilities to succeed in this rigorous program—Dr. Seshadri Mohan in 2008 founded the Engineering Scholars Program (ESP) at UALR. Dr. Mohan defined the program and successfully procured grants from the Winthrop Rockefeller Foundation and the Arkansas Science and Technology Authority to launch ESP.



The objective of ESP is to increase the number of students entering engineering programs in Arkansas through exposure to hands-on engineering projects, plant trips, and interaction with industry engineers. In addition, the two-week residential summer program includes counseling and advising sessions to assist students in preparing for college. In summer 2009, the second year of the program, 16 high school students

spent two weeks at UALR studying with WiNS research scientists. The exposure to engineering counseling and advising sessions helps high school students make informed choices on appropriate course work during their high school years for pursuing future careers in engineering.

ASU WiNS Team to Test Nanotubes to Treat Spinal Cord Injuries

At Arkansas State University, WiNS Researcher Dr. Malathi Srivatsan and members of her research team are testing target specific nanotubes for promoting neuroregeneration in spinal cord injuries. Each year 11,000 new spinal cord injuries are reported in the United States. Most of these patients are in their prime and often suffer drastic reduction in quality of life requiring costly supportive care. Finding ways to promote regeneration of the spinal cord that will lead to functional recovery has become an urgent and critical challenge. While presence of trophic molecules and transplanted stem cells offer hope for regeneration, a critical obstacle for functional recovery is the inability to direct the growth of axons towards appropriate targets in order to make synaptic connections.



Dr. Srivatsan and University of Arkansas, Fayetteville WiNS Researcher, Dr. Vijay Varadan believe that carbon and magnetic nanotubes will provide an ideal medium to promote directed growth of axons towards their targets and deliver trophic molecules to stimulate neurons. Research has shown that these nanotubes can enhance the survival and growth of neurons in a controlled cell culture. As a next step, Dr. Srivatsan wants to test these nanotubes on an animal model using a spinal cord injury impactor to mimic human injury conditions in rats.

P3 CENTER UPDATE

Arkansas Scientists Develop a Natural Source of Resveratrol

Resveratrol has been one of the most studied plant-derived compounds over the last several years. Research has shown its beneficial effects on expanding the life span of rodents. Many different uses have been found for the compound, especially in the area of human health, such as its use as an antioxidant and several different anticancer properties. The full extent of its benefit to human health is still being discovered. Resveratrol is produced by certain plants in response to extreme environmental challenges or pathogen attack. Though it is most commonly recognized as being derived from red wine, resveratrol is not unique to the skins of grapes. Several different plant species produce resveratrol including, blueberries and peanuts. When growing in the wild, these plants produce significantly varying amounts of resveratrol unique to the level of exposure to environmental hardships each plant receives.

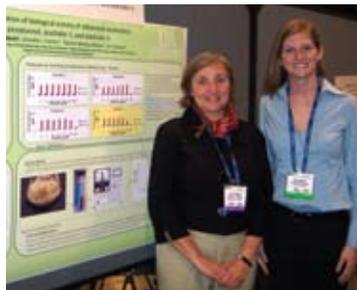


Experimental research led by Dr. Fabricio Medina-Bolivar and Dr. Maureen Dolan of Arkansas State University (ASU) has shown that the hairy roots of the peanut plant can be a consistent source of high quality resveratrol. Dr. Medina-Bolivar, an associate professor of Metabolic Engineering at ASU and the Arkansas Biosciences Institute, brings many years of research experience in manipulating plant roots to produce biologically active compounds in a laboratory setting. He applied this knowledge to the root system of the peanut plant to induce the roots to produce a defined and controlled amount of resveratrol. In addition to resveratrol, the peanut roots can also be manipulated to produce consistent quantities of other important compounds to human health such as pterostilbene, a chemical that reduces cholesterol.

Because of the many applications of these compounds on the food and pharmaceutical sectors, a patent was filed by ASU to protect this innovation.

One of the main advantages of using these root cultures is that they provide a reliable and sustainable source of resveratrol and its natural analogues that can be studied further to identify more uses for these unique bioactive compounds. To this end, Dr. Medina-Bolivar is collaborating with Dr. Malathi Srivatsan, an associate professor of Neurobiology at Arkansas State University, to study the neuroprotective properties of these phytochemicals with a long term goal of developing drugs for the prevention and treatment of neurodegenerative disorders such as Parkinson's disease. Aspects of this work were presented by Dr. Medina-Bolivar at the International Drug Discovery Science and Technology Conference in Beijing, China late last year.

Other ongoing collaborative projects have emerged based on this discovery. Dr. Medina-Bolivar and Dr. Maureen Dolan of ASU are also collaborating



with Dr. Danielle Julie Carrier at the University of Arkansas Fayetteville to study the regulation of biosynthesizing and purification of resveratrol. Preliminary outcomes from this project funded by the NSF-EPSCoR Plant-Powered Production (P3) center were presented by Dr. Medina-Bolivar at the World Congress on In Vitro Biology in Tucson, AZ. Part of this

research was presented by Ms. Julie Abbott, an undergraduate researcher working in Dr. Carrier's lab, at the International Food Technology meeting in Anaheim, California. Her research is focused on the purification of resveratrol after it is cultured.

P3 Researchers Korth and Bluhm Mentor Undergraduates



Each summer, the Department of Plant Pathology at the University of Arkansas sponsors undergraduate researchers from other universities who work closely with faculty members. This year, P3 scientists Dr. Burt Bluhm and Dr. Ken Korth are each mentoring a visiting student through the C. Roy Adair Undergraduate Research Internship program. The Adair Program is funded by an endowment established in memory of Dr. Adair, a USDA-ARS rice breeder who helped establish the Arkansas rice industry. Each participant receives a stipend and invaluable experience working on an independent research project.



John Ridenour is a junior from Poteau, OK and he plans to attend graduate school after his spring 2010 graduation. He is working with Dr. Bluhm on a research project entitled "Characterization of molecular mechanisms underlying diseases caused by *Cercospora* species." After the summer program, Ridenour transferred to the University of Arkansas Fayetteville for the fall semester to continue this research.

Isaac Murphy of Webb City, MO, attends Missouri Southern State University at Joplin and is working with Dr. Korth this summer. He expects to graduate in December and will look for a research position at the University of Arkansas or in Dallas. His research project focuses on "*Medicago truncatula* responses to abiotic stress."

University of Arkansas Fayetteville Undergrad Receives Research Fellowship

Sharon Faye Holifield, a junior from Mountain Home, received one of 15 summer undergraduate research fellowships awarded nationally for 2009 by the American Society of Plant Biologists. Holifield is majoring in Environmental, Soil and Water Science at the University of Arkansas and works in the lab of EPSCoR P3 researcher, Dr. Ken Korth.

The ASPB Summer Undergraduate Research Fellowship provides a stipend for Holifield to work on a research project with Dr. Korth as her faculty mentor. Her project, "The role of glyoxalase I in abiotic stress tolerance of soybean, *Glycine max.*" focuses on the function of this enzyme in salt tolerance. Around one-fifth of irrigated agricultural land in the United States is adversely affected by high salinity. This is a growing problem in Arkansas soils. Preliminary research has shown a model legume species with higher levels of the enzyme glyoxalase I displayed an enhanced tolerance to high levels of sodium chloride and calcium chloride. Ms. Holifield's research will investigate the role of this enzyme in salt stress tolerance of the soybean, an important crop to the state, with the possibility of genetically modifying the crop to increase yield in areas with high salt content.

The SURF fellowships provided by ASPB assist promising undergraduate students with meaningful research experience in plant biology early in their college careers. The 15 awardees will complete 10 consecutive weeks of research and present their results at the Plant Biology Conference, July 31 to August 4 of 2010, in Montreal, Canada. Holifield said, "I am more than excited about being able to do this summer research project. This is an excellent opportunity for me to get my hands dirty in plant biology lab work and to see the research completed by my peers in Montreal next summer."



UALR Bioinformatics Research Team Creates Molecular Interaction Database

Freely accessible biological abstracts exist online en masse within a storage database called PubMed at the National Library of Medicine. Because information on molecular interactions is not always explicitly stated within such texts, searching for these compound to compound relationships is often difficult and time-consuming. To help facilitate investigations into these texts to find specific interactions between biomolecular compounds, Daniel Berleant, Ph.D., Professor of Information Science at UALR and Arkansas ESPCoR P3 Researcher, and students Michael Bauer and Lifeng Zhang, are using PathBinder and ISDB, software systems that they have created to help create a database for this information. PathBinder, for example, is a program that mines specific data from large amounts of texts. In this particular case, the program mines for facts about molecular interactions.



PathBinder is designed to seek out sentences which contain biomolecules in them to determine if information about interactions is described. PathBinder then searches publications for sentences describing interactions between biomolecules. Afterwards the program is able to combine evidence from multiple relevant sources to assess the likelihood of interaction between two arbitrary biomolecules. This approach to data mining, called text empirics, supports computationally friendly, automatic extraction of biomolecular interactions from within texts. With the collected data, Berleant and his research team were able to construct a network database of information on interactions between biomolecules based on the likelihood of interaction.

Aspects of this research were presented by Berleant earlier this year at the Sixth Annual MidSouth Computational Biology and Bioinformatics Society Conference held in Starkville, Mississippi. The annual MCBIOS conference has historically attracted internationally renowned speakers and its attendance reflects its status as the premier forum for bioinformatics in the region, gathering faculty and students not just from states in the Mid-South but also from neighboring regions. The seventh annual conference will be held February 19-20, 2010 in Jonesboro on the campus of Arkansas State University and will be chaired by Berleant.

Carole L. Cramer Presents at University of Georgia

Carole L. Cramer, PhD, Executive Director of the Arkansas Biosciences Institute at Arkansas State University presented at the University of Georgia as an invited seminar speaker April 27-28. One of her talks titled Plant Based Bioproduction – Enhancing Vaccines Efficacy through Delivery, Presentation and Immuno-modulation was to the College of Veterinary Medicine/Department of Infectious Disease and focused on the production of animal proteins with potential applications in vaccines. This work was specific to targeting applications in protection against influenza (bird flu and swine flu). The other talk was titled Plant Powered Production and was hosted by and presented to the University of Georgia's Complex Carbohydrate Research Center. It focused on the use of plants as production factories for high value proteins and chemicals with the potential to enhance human health. Dr. Cramer serves as the lead of the plant based bioproduction project, Plant-Powered Production (P3) Center.



UNDERGRADUATE RESEARCH FELLOWSHIPS

Students at Arkansas Universities Receive NSF EPSCoR Grants for Summer Research Projects

The NSF EPSCoR Summer Undergraduate Research Fellowships (SURF) are highly competitive grants given to student researchers with the unique opportunity to conduct advanced levels of research with the guidance of mentors in their field of study.

Biofuel from Algae: Maximizing Lipid Production from *Dunaliella salina*

Kristen Kahler
Southern Arkansas University
Mentor: Dr. Thomas Smith

Non-Natural Protein Mimetics for the Treatment of Alzheimer's Disease

Jennifer Herrera
University of Arkansas at Fayetteville
Mentor: Dr. Shannon Servoss

The Role of NHE1, NHE2, and NHE3 Isoforms in MCF-7 Breast Cancer Cell Survival in the Tumor Microenvironment

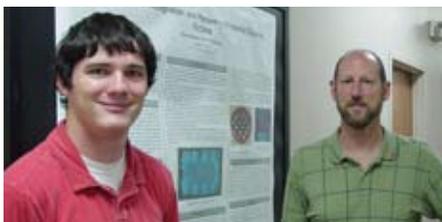
Kevin McElhanon
University of Central Arkansas
Mentor: Dr. Steven Runge

DC Electric Power Systems for Residential Applications

Laura Lawson
University of Arkansas at Little Rock
Mentor: Dr. Jing Zhang

Autonomous Drowning Detection and Rescue

Steven Nelson
University of Central Arkansas
Mentor: Dr. Paul Young



Epigenetic Effects and Behavioral Consequences of Prenatal Stress

Amrit Anand
University of Arkansas for Medical Science
Mentor: Dr. Craig Cooney

Analysis of B-cell Antibody Gene Segment Use in Response to Mercury Treatment

Heather Clarke
University of Central Arkansas
Mentor: Dr. Ben Rowley



Computer Simulation Study of Confidence Intervals for Intraclass Correlation Coefficients

Shauna Leonard
Arkansas State University
Mentor: Dr. Hong Zhou

12 Volt Solar Powered Portable Refrigerator

Ashley Brown
University of Arkansas at Little Rock
Mentor: Dr. Hirak Patangia

Changes in Calcium and Vitamin-D in Armadillo Milk during the Course of Lactation in Relation to the Growth of the Neonates' Carapaces

Suzanne Watts
College of the Ozarks
Mentor: Dr. Frank Knight

Tracing Organic Carbon Sources in Lake Maumelle

Dawn Johnson
University of Arkansas at Little Rock
Mentor: Dr. Amelia Robinson

Can the Caval Region of the Common Dolphin (*Delphinus delphis*) Diaphragm Regulate Vascular Pressure during Dives to Depth?

Jennifer Cooper
Hendrix College
Mentor: Dr. Jennifer Dearolf



Efficient and Innovative Solar Water Heater

Kathryn Sesler
John Brown University
Mentor: Dr. Larry Bland

Identification of Genes That Act Downstream of Neurogenin1 in Nociceptive Neuron Development

Lin Poff
Hendrix College
Mentor: Dr. Richard Murray

Transesterification Reaction of Triglycerides in scCO₂ Using Soluble Tin Catalysts for Biodiesel Production

Samuel Collom
University of Arkansas at Little Rock
Mentor: Dr. Anindya Ghosh

The Exotic Eurasian Collared-Dove (*Streptopelia decaocto*) in Arkansas: Dispersal, Basic Ecology, and Effects of Native Species

Mike Fielder
University of Arkansas at Fort Smith
Mentor: Dr. Ragupathy Kannan