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PRAIRIE VIEW A&M UNIVERSITY
The Office of Research, Innovation and Sponsored Programs

RESEARCH BRIEFS

Research Symposium Special Edition

CONTRIBUTOR KAREN B. COTTON

The Office of Research, Innovation, and Sponsored Programs (ORISP) has committed itself to sharing the story of research at Prairie View A&M University. ORISP partnered with the Office of the Provost and joined the longstanding symposia hosted by the College of Juvenile Justice and Psychology to create one unified, university-wide research symposium.

The symposium highlighted both undergraduate and graduate students, and it showcased the research of our STEM and NON-STEM faculty members. We invite you to peruse the pages of this Special Edition of Research Briefs as we share with you the excellence and innovation that is inimitable in the research efforts of our students and faculty.

Research Briefs is one of many approaches we use to ensure PVAMU research is both noticed and noted by global research communities.

IN THIS ISSUE

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Dr. Orion Ciftja: Professor of Physics, Solves the Puzzle of the Unexpected Behavior of an Extremely Small Capacitor

His theoretical work appears in the peer-reviewed journal, *Royal Society of Chemistry Advances*

CONTRIBUTOR RAMASWAMY KRISHNAMOORTHI

O. Ciftja, Origin of the anomalous size-dependent increase of capacitance in boron nitride–graphene nanocapacitors, RSC Adv. 9, 7849 (2019). DOI: 10.1039/C9RA00614A

Extremely small compounds exhibit fascinating and useful chemical and physical properties that are different from those of the same compounds in the bulk state. Here, extremely small means one billionth of a meter- a nanometer. Boron nitride, which is made from boron (the compounds of which we consume in minute quantities from plant foods) and nitrogen (an abundant and inert gas present in air), when enclosed between sheets of graphene (a particularly thin, single layer of carbon atoms) stores electrical charges as a capacitor does. Unlike ordinary capacitors, ultra-small capacitors routinely manifest a decrease of capacitance with a decrease of thickness. However, for nanometer-size lengths, the boron nitride-graphene capacitor, behaves abnormally—its storage capacity increases, rather than decreases, as thickness decreases. Thus far, scientists in the field have attributed that anomalous behavior to "subtle quantum effects"—effects that exert their presence only when the size is very, very small.

Ciftja used a classical approach to study the strange size-dependent behavior of the boron nitride-graphene capacitor. He introduced a model and calculated the capacitance values of the system for different sizes in agreement with the experimental values reported. In a nutshell, Ciftja's work has established that one does not need to invoke inexplicable quantum effects to understand the boron nitride-graphene capacitor, as classical physics is quite adequate for the purpose.

Experiences in PVAMU Undergraduate Research:

Great Tools for Students' Academic and Professional Excellence

CONTRIBUTORS BRYANA JACKSON, JUNIOR, DEPARTMENT OF MECHANICAL ENGINEERING
MENTORS DR. GRACE ABOLAJI, OFFICE OF UNDERGRADUATE RESEARCH (OUR) DR. STEPHANIE BURRS, DEPARTMENT OF MECHANICAL ENGINEERING

During the Spring semester of 2018, I worked with Dr. Abolaji as a volunteer research assistant at the Office of Undergraduate Research (OUR). She taught me the research process and engaged another student and me in action research of constructing a simple lever wooden press that we used to produce doughnut-shaped paper only and a mixture of paper and sawdust briquettes, and studied the combustion tests of the briquettes produced. We made a presentation at the 13th Annual Research Symposium of April 5, 2018, pointing out the importance of briquettes as a renewable energy source for cooking and heating.

In Fall 2018 semester, I started working as an hourly paid undergraduate research assistant with Dr. Abolaji at the OUR. She is collaborating with a faculty mentor Dr. Stephanie Burrs at my department, Mechanical Engineering with a team of other undergraduate students. We had meetings once a week to discuss the research Dr. Burrs had worked on previously and is currently working on with Dr. Abolaji. Dr. Burrs would give us research articles to read so that we could familiarize ourselves with the reports, and see what a published research paper looks like. Dr. Burrs would then have us present over the articles we read in front of the rest of our research team. Dr. Burrs would give us constructive criticism at the end of the presentation, and help us with any of the research terms or chemical names that we struggled to pronounce. This helped us both share the information we gathered, and become more comfortable presenting in front of a group. It also served as good practice for when we will go to a research symposium or a conference.

During the fall semester, we also learned how to use an SEM machine and analyze the treated metals we were experimenting on. We learned how to write our experimental procedures, conduct experiments with lab safety, write experimental data within our notes and work as a team to conduct our investigations.

This spring semester, we have started by dividing into groups. One group focused on nanoparticle research, one group focused on food safety, and one group focused on one implants. I am a part of the food safety group, and currently, my teammates and I have gathered new articles discussing biosensors and their role in food analysis. Most of the materials addressed the detection of bacteria or pesticides that are highly toxic and can have a harmful or fatal effect on humans. My teammates and I are currently trying to find the best type of biosensor, and technique to use for our study, and presenting them to Dr. Burrs and Dr. Abolaji.

I have come to learn a lot about the research process. Although I have done a small amount of research before for the companies I had worked for; this was the first time I have done a proper research study with a group. I feel that I am accomplishing and learning more every day. Participation in undergraduate research at Prairie View A&M University has helped develop my knowledge and skills in the research process, confidence in presenting research outcomes, better academic performance, and increased motivation to continue to learn more from the mentors. I am excited to participate again in the up-coming Aprill 11, 2019 Campus-wide 14th Annual Research Symposium where I will be making a poster presentation on Fabrication of Acetylcholinesterase Biosensors and Their Use in the Detection of Pesticides.'' Contamination in Food Products.

Center for Energy & Environmental Sustainability

A Question & Answer Session with Dr. Raghava Kommalapati

CONTRIBUTOR RAMASWAMY KRISHNAMOORTHI

Dr. Raghava Kommalapati, Professor of Civil Engineering, is the Director of Center for Energy & Environmental Sustainability (CEES). CEES was established in 2010 with a five-year, $ 5 million grant from NSF. Over the years, the Center has won many grants totaling $ 3.7 million from various federal funding agencies, such as Department of Transportation, Department of Energy, Department of Education, and the American Chemical Society, for research and educational activities. ORISP recently interacted with Kommalapatti to learn more about the research and educational activities of the Center.

Q: What are the major problems in the areas of energy and environmental sustainability?

A: We still do not have adequate renewable energy to meet the increase in global demand. Biofuel production from renewable biomass is expensive. Moreover, effective technologies are yet to be developed to treat shale oil and gas-produced water.

Q: What are the projects in progress in CEES?

A: We are working on a variety of projects: biofuel production from biomass, computational fluid dynamics modeling for wind turbine designs, carbon capture by nanotubes, methane production from food waste, and shale oil and gas-produced water treatment.

Q: How different are your approaches to the current problems in energy and environmental sustainability?

A: We employ a life cycle assessment to study the sustainability of different energy technologies. For example, shale oil and gas-produced water is treated using advanced membrane separation techniques, including forward and reverse osmosis.

Q: What are the unique strengths of CEES?

A: The Center has a top-notch research infrastructure. We have sophisticated instruments for gas chromatography-mass spectrometry (GC- MS) and high-performance liquid chromatography, ultrafiltration membrane systems, computing clusters, and spectrophotometers. Moreover, the Center has developed reputed multi-disciplinary research programs in bioenergy, wind energy, and environmental sustainability.

Q: Tell us about the different disciplines and faculty members who work on the various projects at the Center.

A: CEES enjoys the strength of a large group of faculty members from different departments working on several projects:
Ananda Amarasekara from Chemistry, Paul Biney from Mechanical Engineering and Michael Gyamerah from Chemical Engineering work on bio-oil and biofuel production; Ziaul Huque from Mechanical Engineering on wind energy; Kelvin Kirby from Electrical Engineering on education and outreach activities. I lead the work on air quality and life cycle analysis of different energy technologies. Post-doctoral fellows, Hongbo Du, and Daniel Kim work on shale oil and gas-produced water treatment and fluid dynamics simulations for wind turbines.

Q: Tell us how undergraduate and graduate students contribute to the Center's research projects.

A: CEES has a long history of providing research opportunities to undergraduate as well as graduate students. So far, 36 graduate students have completed their MS thesis research projects at the Center; 173 students, 39% of whom are women, have obtained research experience.

Currently, we have two graduate students--Ayobami Orangun working on bioenergy from food waste and Nikith Sarsam working on life cycle impact of solar power.

Undergrads--Brittani Turner, DeJaune Bickham, Cayla Guillory, Courtnee Plumbar, and Mohammed Hussein--are working on bioenergy from food waste and treatment of shale oil and gas-produced water.

Q: What may we expect in the next five years from the Center?

A: A five-year Phase II proposal for our NSF-CREST grant is currently pending with NSF. We plan to continue our work on bioenergy production from the feedstock, efficient wind energy production, energy sustainability from fossil fuel, and last but not least, enhancement of our engineering education and outreach programs.

Why we should not apply excess water to our turf grass

A new paper by Dr. Ripendra Awal and colleagues demonstrates the link between irrigation water, energy consumption, and carbon dioxide emission

CONTRIBUTOR AWADH BINHAZIM AND TESFAMICHAEL KEBROM

Can you imagine how much water will be lost when applying 1 inch (25 mm) more water than required for irrigating turfgrass across Harris County in Texas? In a recent paper published in the journal Sustainability, Drs. Ripendra Awal, Ali Fares and Hamideh Habibi, scientists at the College of Agriculture and Human Sciences (PVAMU), figured out to be 10.45 million m3 of water loss, which is equivalent to the annual water use of 30,561 single-family houses.

Furthermore, the authors determined that 4,413 MWh energy will be used to apply the extra 1-inch water, and 2,599 Metric tons of carbon dioxide (CO_2) will be emitted to the atmosphere, contributing to global warming. The excess energy used would be enough to satisfy the needs of 1,053 county residents. In this study, the authors calculated the site-specific irrigation water requirements for turfgrass across Harris County and then estimated the corresponding total energy use and CO_2 emission reduction if the optimum irrigation water requirement is adopted. They used the Irrigation Management System model for estimation of the irrigation water requirement. This model uses site-specific soil hydrological and crop water uptake parameters with long-term rainfall and evapotranspiration data to calculate the landscape optimum irrigation requirements. The results showed that the estimated annual irrigation requirement of turfgrass varies from 686 to 940 mm with a county average of 783 mm (323 million m3), and requires 136 GWh of energy which emits 80,236 metric tons of carbon dioxide annually.

The findings of this work show the strong connections between optimum water management, energy use, and greenhouse gas emissions.

For more details, you can access the paper in the link - ***https://doi.org/10.3390/su11051440***.

Research Horizon Seminar Series:

Dr. Camille Gibson Demonstrates Impact of Technological Socializing by Youths on Conventional Bonds and Behavior

CONTRIBUTOR RAMASWAMY KRISHNAMOORTHI

Dr. Camille Gibson, Interim Dean of College of Juvenile Justice and Psychology, presented a thought-provoking seminar entitled, "Youth Devotion to Technological Socializing: Impact on Bonds, Learning, and Behavior" on March 22nd to an enthusiastic group of students and faculty. Gibson, who earned her Ph.D. degree in Criminal Justice from the City University of New York, has many scholarly publications in the areas of drug trafficking, race and school suspensions, sexual abuse, child abuse, juvenile violence, and sex trafficking. Her books include *Being Real: Student-Teacher Interactions and African American Male Delinquency and Juvenile Sex Offending: What the Public Needs to Know*.

Gibson presented survey data collected by her students, Sherri Simmons-Horton and Melanie Prudhomme, from a sample of middle school students in rural, urban, and suburban areas in Texas. The survey instrument included questions probing choice of social media, time spent online, and nature of the online practice, and impact on the parent-child relationships. Gibson analyzed the data to test her hypothesis that increased social use of technology weakens both conventional relationships and learning of acceptable behavior. Gibson's preliminary findings included both positive and negative aspects. For example, while a majority of respondents indicated that internet use allowed for expanded social activities and planning, a substantial fraction of the respondents admitted to online activities that they would not share with their parents.

A lively and lengthy question and answer session followed the seminar. Gibson has plans to analyze further to identify relationships between various subsets of the data.

Accomplishments of Faculty and Researchers Honored with Awards during Research Week

CONTRIBUTOR RAMASWAMY KRISHNAMOORTHI

Faculty members and researchers from several colleges and the School of Architecture showcased their projects through poster presentations in the striking, new Welcome Center on April 10th, the first day of Research Week celebrations. Fifty-three abstracts were received, and 49 posters were displayed. A total of 80 people attended the day-long event.

The posters were judged and rated on a scale of five points each for seven criteria including the significance of the research goals, methodology, quality and importance of the results obtained, and the broader impact of the project, by 14 faculty members from various disciplines. The posters were ranked according to their overall average scores, and three top-ranking posters were honored with cash awards ($500, $400, and $300) in STEM and non-STEM categories. The poster securing the highest average score of all earned the overall best poster award ($600).

The following faculty members/research scientists were honored:

Gary Newton, Cooperative Agricultural Research Center (overall best poster)
Title: *Characterization of the Uterine Microbiome in Capra Hircus*

Ahmed Ahmed, Computer Science (1st place – STEM) Title: *Building a Robotic Scout UAV for Pipeline Corrosion Detection*

Walle Engedayehu, Social Work (1st Place – non-STEM)
Title: *An Exploratory Study in Israel: The cases of Ethiopian Jews (Beta Israel) and the Ethiopian Orthodox Tewahedo Church (EOTC) Monasteries in the Holy Land*

Yunxiang Gao, Chemistry (2nd place – STEM)
Title: *Mono-domain Liquid Crystalline Elastomers for Soft Robotics and Tissue Engineering Applications*

Danny Harvey, Finance (2nd Place – non-STEM)
Title: *Changing the Money Mindset of Young People: A Study of the Knowledge Transfer and Behavior Change Effects of a Financial Education Program*

Ripendra Awal, Cooperative Agricultural Research Center (3rd place – STEM)
Title: *IrrigWise: An Irrigation Scheduling Tool to Increase Irrigation Water*

Louis Ngamassi, Management Information Systems (3rd place – non-STEM)
Title: *Use of Mobile Apps for Disaster Communications in Underserved Communities: Challenges and Opportunities*

ORISP also honored outstanding researchers in STEM and non-STEM categories. A six-member committee consisting of administrators and faculty members reviewed individually the nominations of faculty members and scientists using the criteria of grant support, publications, and other scholarly records, external awards won, and extent of student mentoring in research. Each outstanding researcher was honored with a cash award of $ 1500 and a plaque. Other nominees were each recognized with an award of $500.

The following were the winners of outstanding researcher awards:

Orion Ciftja, Professor of Chemistry

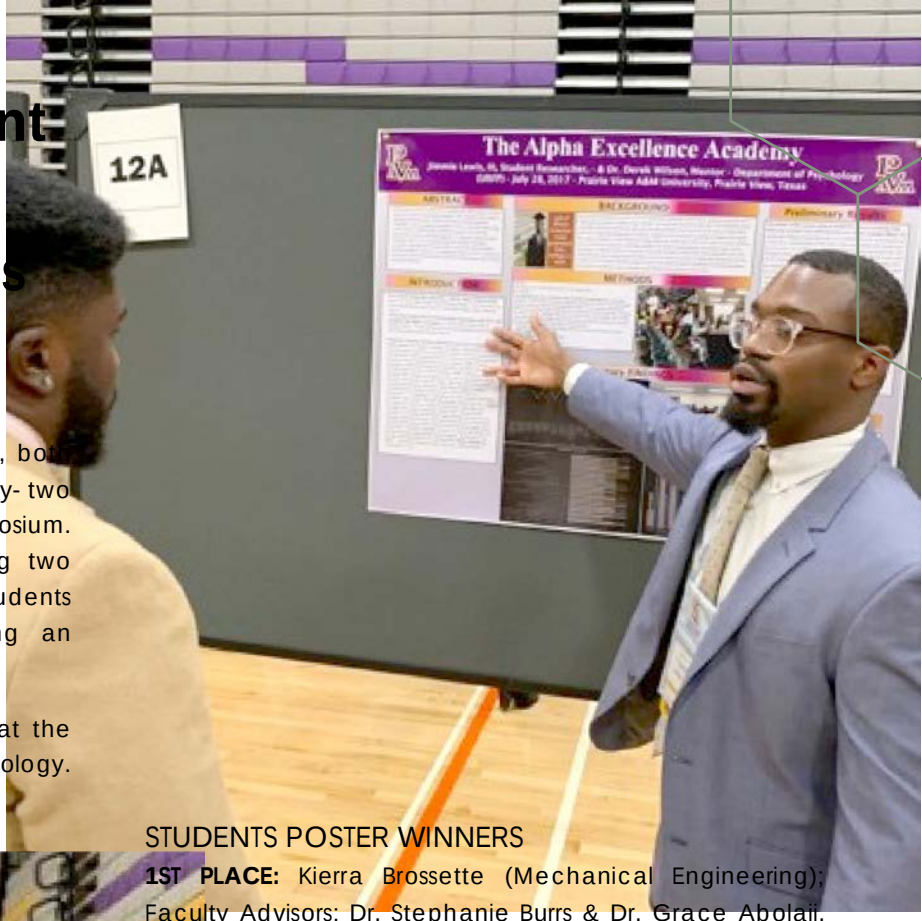
Sesha Kethineni, Professor of Criminal Justice

Louis Ngamassi, Associate Professor of Management Information Systems

Ripendra Awal, Research Scientist, Cooperative Agricultural Research Center

Undergraduate Student Excel at Annual Research Week Events

CONTRIBUTOR GRACE ABOLAJI PH.D



Day Two of Research Week focused on students, both undergraduate and graduate. One hundred and fifty- two (152) students made presentations at the symposium. There were 112 posters and 40 papers, including two singing performances and a video documentary. Students were judged by faculty and staff judges using an innovative online iPad application.

On Day Three was the Award Ceremony, held at the Don K. Clark Building for Juvenile Justice and psychology.

STUDENTS POSTER WINNERS

1ST PLACE: Kierra Brossette (Mechanical Engineering); Faculty Advisors: Dr. Stephanie Burrs & Dr. Grace Abolaji, "Characterizations of Bio-sensing Transduction Platinum Layer for Improved Performance of Nanoparticles Use across Different Applications

2ND PLACE: Kolada Adelaja (Computer Information System/Assistantship in Agriculture), Faculty Advisor: Dr. Peter Ampim, "The Evaluation of Vegetable Amaranth in Southeast Texas."

3RD PLACE: Jeremy Daniels (Mathematics), Faculty Advisor: Dr. Indika Rathnathungalage, "Impact of the Sample Size and the Number of Covariates in Regression Analysis."

STUDENTS PAPER WINNERS:

1ST PLACE: Stephen Aisabokhae (Community Development), Faculty Advisor: Dr. Tiffany Thomas, "Mentoring as a Tool for Fostering Personal Development among Youths in Uganda with Emphasis on Ages 11 -18. Case Study: Uganda Women's Network (UWONET) – School Mentorship Program 2018"

2ND PLACE: Pranay Krishna Katari Haribabu (Mechanical Engineering), Faculty Advisor: Dr. Ziaul Huque, "Comparison Study of Structural Health Monitoring of Wind Blade Using Numerical Simulation between ElastoDyn and BeamDyn."

3RD PLACE: Jennifer Bourgeois (Administration of Justice, Tex

Intellectual Property Protection and Commercialization:

TEES Team Presents an Illuminating Seminar at PVAMU

CONTRIBUTOR RAMASWAMY KRISHNAMOORTHI

The Commercialization and Entrepreneurship Group at Texas A&M Engineering Experiment Station (TEES) at College Station, Texas gave a talk on "Intellectual Property (IP) for Inventors" at PVAMU. ORISP organized the visit of Nick Chremos, Director of Intellectual Property Licensing, Shyamala Rajagopalan and Sheik Ismail, Licensing Managers. Chremos, a patent attorney with an electrical engineering degree, described the two criteria for the issuance of a patent—the invention should be novel and it should not be an obvious one to a person of ordinary skill in the field of the invention. He explained the protection afforded by copyright and what can and cannot be copyrighted. In particular, he explained that copyright protects the original expression of an idea rather than the idea itself. For example, in the context of software, copyright might protect source code, which is an expression of the underlying algorithm. The algorithm itself (i.e., the idea) could potentially be eligible for patent protection but would not necessarily be eligible for copyright protection.

The TEES team presented a detailed map of steps and timelines involved in obtaining a patent for an invention. Rajagopalan, a Ph.D. chemist with research experience in the industry, described the arduous task of commercializing a patent through licensing. She explained how industries need to be convinced with pilot studies at a larger scale than the laboratory of a process or invention. Rajagopalan presented examples of how industries could be attracted to invest in faculty research. Ismail, a Ph.D. biologist with university research and licensing experiences, explained how faculty could initiate the first step of patenting their IP protection with the disclosure step while simultaneously submitting their work for publication. The TEES team also provided ideas to faculty about developing SBIR and STTR grant proposals.

The seminar elicited enthusiastic participation from the attending faculty members and students, who showed up in large numbers, even as the semester was nearing final exam week.

UPCOMING EVENT

DATE	EVENT	LOCATION
August 6, 2019	U.S. Department of Defense	PVAMU Multiple Locations

Ali Fares, Interim Vice President Research, Innovation, and Sponsored Programs
Karen B. Cotton, Editor

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