Highlights

National Conference on Undergraduate Research

Software Research Advancement Group

Multisite Phosphorylation of eNOS
By Various Kinases and the Impact of Calmodulin: Why the Study of it
May Affect Us All

Alexander Group

Undergraduate Research Club

Interview: Sung-Hee Kim
KSU will sponsor up to 75 students to attend the National Conference on Undergraduate Research (NCUR) on April 7-9, 2016 at the University of North Carolina in Asheville. NCUR is the largest conference on undergraduate research in the country, with over 4,000 undergraduates presenting through posters, oral presentations, performances, etc. every year.

Students from all fields and disciplines are welcome to present. KSU will pay all the expenses for up to 75 individuals who are accepted to present at the conference. The deadline for submitting an abstract to NCUR is December 2, 2015 and students will need to submit their application for KSU funding by December 3, 2015. Recipients will be notified of their acceptance for NCUR by January 22, 2016.

“A few years ago I had the opportunity to present a poster at NCUR in Utah,” said Courtney Collins, a psychology major who graduated from KSU in 2012 and received the Chancellor’s 2012 Academic Recognition Honor. “NCUR was great because there were so many students there and everyone who we met really loved research. It was so cool to meet students from all around the US and to see how they had conducted research.”

Established in 1987, the National Conference on Undergraduate Research (NCUR) is an excellent opportunity for students to meet peers and faculty in similar research fields and to learn about scholarship and research. Graduate school and career fair representatives attend the conference as well, providing students with professional opportunities.

“Students from all different disciplines were there and it was a great opportunity to see how research differs from one area to the next,” Collins said. “The enthusiasm that the students had about their projects was evident in everyone who we talked to. I presented at several conferences during my school career but NCUR was one of the most enjoyable places that I presented.”

Software Research Advancement Group (SRAG) is a new group formed in the spring of 2015. Currently, the faculty members include Dr. Sheryl Duggins, Dr. Lei Li, Dr. Rongkai Guo, Dr. Paola Spoletini, Dr. Chi Zhang, Dr. Dan Lo and Dr. Frank Tsui, all in the College of Computing and Software Engineering. There are approximately ten undergraduate students actively participating in research with these faculty members.

The Basic Mission of Software Research Advancement Group (SRAG) is to promote and encourage (a) software research activities among faculty members, (b) the mentoring of graduate and undergraduate students in software research, and (c) collaborations with members of other departments and other domains/fields for broader research.

Some of the past activities have spawned research activities with undergraduate students. For example, students have participated in summer NSF sponsored PSLSAMP projects, undergraduate honor’s projects, undergraduate internship projects, etc. Their research areas include topics in i) software requirements engineering and ambiguity analysis; ii) game and virtual reality modeling for the visually impaired; iii) web information categorization techniques and data analysis; iv) basic definitions of “equal” and “similarity” operators and their applications; v) systems security and security education.

Recently, Dr. Amy Buddie made a presentation on KSU’s direction, resources and support for undergraduate research to the group. She introduced many funding and conference opportunities, including the upcoming National Conference on Undergraduate Research. They are planning to have some submissions to that conference and others.

They meet in Room J381 at noon on the Marietta campus every other Wednesday of the week. Interested students should contact any one of the above mentioned faculty members. All interested students are welcome. For general information about SRAG please e-mail Frank Tsui at ftsui@kennesaw.edu.
Alberto Romero, just one part of an amazing duo, says he found this particular research matter to be both tragic and serendipitous. “Both my mother and sister were diagnosed with diabetes and my father lost his battle to cancer. So when I found out I could potentially conduct research on endothelial nitric oxide synthase (a key component of both disease states), I could not help but jump at the chance!” Endothelial nitric oxide synthase (eNOS) produces nitric oxide (NO), which is a potent vasodilator, which means it dilates the blood vessels. They work directly on the muscles in the walls of your blood vessels, causing them to relax, thus increasing blood flow. “NO is also involved in inflammatory events that take place throughout the entire body, guides formation of neuronal growth cone filopodia, and is a mediator in angiogenesis,” Alberto explains. This is what links eNOS to diabetes and cancer. Tumors sustain themselves by recruiting blood vessels through blood vessel formation (angiogenesis) and diabetics have higher levels of inflammation. The study of eNOS activity potentially gives a new target for treatment options as it can either reduce or produce inflammation and vascular disease associated with diabetes and either promote or inhibit the growth of cancerous tumors.

Getting the opportunity to be paired with a great mentor didn’t hurt either. Alberto describes his research as an enriching journey made possible by his faculty mentor, Dr. Carol Chrestensen. “It is rare to come across Dr. Carol Chrestensen without being greeted with a wide smile and a kind word. Her warmth is only surpassed by her zeal for teaching and her bright mind,” says Alberto. “With her guidance, our research on endothelial nitric oxide synthase (eNOS) and its various kinases gleaned novel data. In order to further elucidate the details of eNOS activation or deactivation, we tested the phosphorylation of eNOS by various kinases at various phosphorylation sites with and without the presence of calmodulin. We also ran a time course to obtain a qualitative sense of potential kinase binding order/affinity. We discovered that a kinase that was unknown to bind our enzyme actually binds at all the regulatory sites we were studying. This data is publish-worthy and is being further studied at the moment.” In more layman terms, Alberto and his team have studied how different kinases interact with eNOS and have found that there is a kinase that may be part of the enzymatic pathway that regulates eNOS activity. The better this pathway is understood, the closer the pathway can be manipulated to benefit humanity.
Alberto is also a Birla Carbon Scholar recipient. “Ever since I presented as a Birla scholar I had various opportunities to present my research. I have presented at Kennesaw’s Birla scholar symposium, received a full travel scholarship to present my research in San Antonio at a biomedical research conference, and most recently at Kennesaw’s 20th Annual Symposium of Student Scholars where I was honored to receive an award for best poster presentation.”

Alberto Romero

Mallory Welton, was the recipient of CETL’s 20th Annual Symposium of Student Scholars first place award for best poster presentation, a success that Alberto attributes to the mentorship of Dr. Carol Chrestensen. Alberto Romero is a Biology major and just graduated from KSU this past Spring. He’s going on to medical school at Mercer University in Savannah, Georgia. When asked what kind of doctor he would like to be he says, “A good one.”
I’m excited whenever I find out there are people out there looking for ways to make the things we need more affordable. Especially when those things are something we all will inevitably need at some point in our lives. Drugs are expensive, and much of the cost reflects the price of the chemicals used to make them and/or the difficulty of the synthesis. Many of the drugs we take fall under the class of compounds known as heterocycles, cyclic molecules which contain one or more atoms that are not carbon (but are Nitrogen, Phosphorus, Sulfur, Oxygen, etc.). The intermediate that the Alexander Group is working on provides inexpensive and easy access to heterocycles.

James Law, a Biochemistry major here at KSU and a Birla Carbon Scholarship recipient explains this groundbreaking research. “The catalyst used to make our mixed esters, Amberlyst 15, is cheap and recyclable. Heterocyclic chemistry remains challenging and there is want to develop methodologies which would lead to convenient synthesis of these molecules. Our group has developed methods to create precursors which could be easily converted into a variety of heterocycles in one step with high selectivity. The precursors I’m referring to are known as thioesters, specifically, mixed 1,3- O,S -esters. Me and David P. Kercher, working with guidance from our mentor Dr. Christopher Alexander, have developed a convenient, one-pot synthesis of these mixed esters. The reaction rarely requires any purification and is met with excellent yields ranging between 70-100%.”

You may have seen James at an event on campus. “The foundations for this work were presented in the Birla Carbon Symposium of 2014 last summer and I have presented this work at SERMACS (the Southeastern Regional Conference of the American Chemical Society) this year in Nashville, TN. I have also presented this work on campus at the CETL Symposium for Student Scholars in Spring 2015.”

James Law is another outstanding testament of how beneficial it is to participate in undergraduate research. “I have learned more in the year I have worked with Dr. Alexander than I have learned in all of my courses combined (and I am a senior).

My experience with Dr. Alexander, and the other faculty I have worked with here at Kennesaw State University, Dr. John Haseltine and Dr. Bharat Baruah, has significantly prepared me for graduate school. I have gained laboratory confidence, named a molecule and I am confident in my abilities to create it.”
Are you an undergraduate looking to get involved in research? Consider joining the Undergraduate Research Club (URC), a Registered Student Organization (RSO) with lots going on. For example, you can:

• Engage in collaborative research projects with other members of the club. Projects are typically about topics that are of general interest to the campus (e.g., alcohol use and perceptions of safety)

• Help coordinate the Symposium of Student Scholars

• Help evaluate submissions to the Kennesaw Journal of Undergraduate Research

• Write articles for the Undergraduate Research Newsletter

To learn more information, visit our website at http://cetl.kennesaw.edu/undergraduate-research-club-urc or email us at urckennesaw@gmail.com

Like us on Facebook: https://www.facebook.com/KSU-Undergraduate-Research-Club-310874508955854/

Next Undergraduate Research Club meeting is Nov. 20th at 2 PM in Clendenin 1003.
Q: Please introduce yourself.

A: My name is Sung-Hee (Sonny) Kim and I am an associate professor in the Civil and Construction Engineering Department. I received my B.S degree from Inha University, South Korea, M.S. degree from Georgia Institute of Technology, and Ph.D. from Texas A&M University, College Station, TX in Civil Engineering. Currently, I am a director of Georgia Pavement and Traffic Research Center (GPTRC) and Center for Georgia Aggregates Research (CGAR). My teaching and research interests include testing and modeling of pavement materials, transportation geotechnics, and mechanistic based pavement design.

Q: What are you currently researching?

A: I have been awarded two research projects from Georgia Department of Transportation (GDOT) in 2015. Firstly, the GDOT RP 14-12 project focuses on how we can utilize construction waste materials, such as Recycled Asphalt Concrete (RAP), for pavement construction with lower construction costs. Since RAP is considered a waste material, its mechanical property varies sensitively. Pavements are often designed a year or more before contractors ever see the plans and prepare their bids. Often, the RAP that will be used in a pavement hasn’t even been produced; therefore, there is no way a pavement designer can know what the RAP percentage or properties will be as he or she designs the pavement. My undergraduate research assistants and I are investigating the effects of RAP contents and sources on pavement performance as well as pavement distress in Georgia.

The second project on which I am currently working is RP 14-13 GDOT Forensic Guide for Pavements. Due to the absence of a guide for conducting pavement forensic investigation in Georgia, GDOT requested that I evaluate and review the latest documents for compatibility with current GDOT practices. If discrepancies exist, modifications need to be developed and presented to GDOT for acceptance. The research activities include field investigation; pavement distress data review; nondestructive testing; geotechnical exploration; traffic analysis; and asphalt, concrete, aggregate, and subgrade soil testing for verification using the pavement design guide. Based on the study results, a Georgia
version of the pavement guide will be developed to consider the state’s pavement characteristics and practices.

**Q:** How was this opportunity presented to you?

**A:** Since Dr. Tom Currin (Dean of Southern Polytechnic College of Engineering and Engineering Technology) founded the Georgia Pavement and Traffic Research Center (GPTRC) with me, we have been able to successfully support the state agencies, such as GDOT and the Federal Highway Administration (FHWA), through pavement & transportation research, educational programs, and testing services; thus improving the productivity and mobility of Georgia’s highway transportation system. GPTRC has been working closely with GDOT and the pavement industry in Georgia to effectively maintain and expand the existing infrastructure. These strong relations and professional services have provided us this great opportunity. We expect to have even more opportunities in the coming year.

**Q:** What is the desired outcome? How has this enhanced your professional development?

**A:** The outcome from the undergraduate research directly holds true to the new Kennesaw State University mission: “The University’s research, scholarship, creative activities, and public service initiatives expand and apply knowledge, contribute to economic development, and improve the quality of life in local communities, Georgia, the nation and the world.” Kennesaw State University would benefit from the local affiliation by continuing to have me share and highlight our best practices in teaching, service, and practical research in the area of pavement and traffic engineering. The Southern Polytechnic College of Engineering and Engineering Technology and the Civil Engineering Department would benefit from my redesigned courses and widely opened internships and job opportunities for our students through the affiliation. As the research outcomes are published through professional journal articles and presentations, the reputation of Kennesaw State University would be enhanced as a university that maintains a top-notch pavement and transportation engineering program not only in Georgia, but also in the nation.

**Q:** What was the most exciting, challenging, or disappointing part of your research?

**A:** The most exciting and challenging part of my research occurs when submitting my proposal and competing with other universities in Georgia (such as Georgia Tech, UGA, etc). When I had been awarded two projects (RP 14-12 and RP 14-13) after competition, I was very excited. The most disappointing part of my research occurs whenever I hear comments such as “We are a teaching university, not a research university. Our main goal is to teach, not to research”. I believe very strongly that teaching and research are forever integrated. You can’t have one without the other. Both teaching and research are learning experiences. I often discuss my research in the classes I teach in order to push students to think more critically about the way we design. I ask questions such as “How can we design better sustainable infrastructure?” This translates into deeper thinking and inspires problem solving incentive among the students. When I hired an entire undergraduate lab class for the GDOT 10-04 research project, seventeen (17) students prepared concrete specimens and ran concrete tests for the research project. Now, they have all graduated and most of them obtained careers in the concrete industry. Two of the students elected to pursue graduate school, and were able to study at the University of Nevada- Reno and Georgia Tech with full scholarships. From this experience, I found that students learn more through research and critical thinking.
Yunji Kim, a University Honors student, says, “At the time, I was not taking any related courses, so even when I read the articles about the research, it sounded like a foreign language to me.” Yunji, along with Dr. Kim, was worried about her performance as this research calls for a lot of physical activity. However, Yunji says she adapted to it as time went by and it became a part of her daily routine. “What I do in the lab is mainly to prepare asphalt specimen samples according to different job mix formulas, and to run dynamic modulus testing on prepared samples. It might sound like a fairly simple job to do, but considering how sensitive asphalt is, it is a hard procedure. For instance, job mix formulas have to be interpreted in a way so we can imitate field condition in the laboratory. To make 20 correct specimens, more than 40 specimens were made. This can be sometimes rather frustrating,” says Yunji. “This research, however, has been a very unique experience for me. I was able to gain more advanced knowledge in the asphalt field, which increased my understanding in related courses. I am planning on taking a research course for the honors program, and the topic will be related to the project that we are working on right now. I am very excited to study my major-related courses more in depth.”

Congratulations to Dr. Kim and all of the undergraduate research assistants for being awarded this tremendous task and good luck in all your future endeavors!

“”It is my hope that our new Kennesaw State University moves toward being an institution which focuses not only on teaching, but also on research activities.””

- Dr. Kim
21st ANNUAL
SYMPOSIUM
OF STUDENT SCHOLARS
AND UNDERGRADUATE RESEARCH RECEPTION

APRIL 2016

Recognizing excellence in student scholarship & creative activity
Newsletter Submissions

Do you have research that you believe should be highlighted? Do you have a story to share or advice to offer regarding undergraduate research? Your submission could be featured in an upcoming issue of the Undergraduate Research and Creative Activity Newsletter. All inquiries should be made as soon as possible. Email cetl4ur@kennesaw.edu or call CETL at (470) 578-6410 to submit ideas.

EDITOR’S CORNER

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Editor-in-Chief: Dr. Amy Buddie
Editor: Ashley Berberich & Camille McDonald
Layout Design: Kevin Osorio & Grace Easton

CARET Application deadline is January 18, 2016

CARET is a funding program that supports faculty in undergraduate research with students up to $7,500. Research teams must have between 4 to 8 undergraduate students. Applicants are required to present their research at the Symposium of Student Scholars. Submissions need to be turned in by the above date at 11:59 pm. http://cetl.kennesaw.edu/faculty-funding/creative-activities-and-research-experiences-teams-caret-program

IMPORTANT DATES

URCA Applications are due December 4, 2015, February 5, 2016 and April 1, 2016

CETL will fund up to $500 of travel expenses for URCA undergraduate researchers. The next three application deadlines are listed above, all due by 11:59 pm. http://cetl.kennesaw.edu/faculty-funding/undergraduate-research-creative-activities-urca

Symposium of Student Scholars Applications are due March 28, 2016

The 21st Annual Symposium of Student Scholars will be held on April 21, 2016. Submissions are due at the above date at 11:59 pm. Students of all majors and disciplines are encouraged to participate. http://cetl.kennesaw.edu/symposium/call-for-proposals

NCUR KSU Funding Application is due December 3, 2015

KSU is funding up to 75 students to present at NCUR on April 7-9, 2016. NCUR abstracts are due December 2, 2015 and applications for KSU funding are due at the above date by 11:59 pm. KSU will cover transportation, hotel, conference registration and food. http://cetl.kennesaw.edu/faculty-funding/ncur-student-funding

Undergraduate Research Club Meeting is November 20, 2015

Meeting will be held at 2 PM in Clendenin 1003.