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University Honors Program News

Georgia Southern University

Buffering. . . Re. . . search

March 29, 2016

Collin Daly's (electrical engineering '16) honors thesis deals with a problem we have all encountered—video buffering on the Internet. Many Netflix binges have been interrupted due to that pesky rotating circle, signifying a discrepancy between the bandwidth needed to play the video and the bandwidth that's actually available, but Daly's research strives to find a solution. His thesis, entitled "Predicting H.265 Video Traffic Using Neural Networks," deals with using artificial neural networks to replicate the way the mind solves a problem in order to predict the amount of networking space the bandwidth requires to stream high-definition video. Surprisingly, this field of research is still in its nascent stages.

"The video coding format we're working with is almost brand new," said Daly. "The number of papers relating to this are almost nonexistent. It's something new that has a lot of potential that we're trying to move forward with."

Colin Daly shows of his award with his faculty mentor Dr. Rami Haddad.

While this line of study is still developing, its importance should not be underestimated; within the next four to five years, Cisco predicts that multimedia, particularly high-definition video, will account for nearly all of the Internet's traffic. Currently, networks cannot sustain that level of activity, so Daly has tasked himself with trying to figure out how to break this data into smaller, sustainable chunks.

Daly said, "We're using neural networks to replicate how the brain works. In other words, we're using many slower, more accurate calculations at the same time rather than a series of faster, less efficient, and more error-prone calculations so we can figure out how much bandwidth is required to play high-def videos without waiting for them to buffer."

This experiment involved comparing two different styles of network, a recurrent system using error correction, and one that did not. Of the two, the former proved to be a much better system and will be used as a basis for further research.

In the meantime, Daly took his findings to both the Georgia Collegiate Honors Council conference at Augusta University and the American Society for Engineering Education (ASEE) conference at the University of Alabama in Tuscaloosa. At both meetings, Daly had the distinction of being the only undergraduate representing Georgia Southern.

"Attending both conferences gave me a lot of perspective," said Daly. "The engineering conference was obviously much more tailored to my project, so there was much more general interest and many technical questions. It was interesting to see the other side at the general honors conference, though, because you get feedback from students coming from different disciplines, bringing fresh perspectives to your project."

Daly's hard work won him second place in the undergraduate research division of the ASEE conference, an award well-deserved.

"Conferences like these are really encouraging," he said. "They give you the opportunity to realize that there is an outlet for research, and that we can contribute to conversations in our fields in meaningful ways."

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Searching for Blood Substitutes

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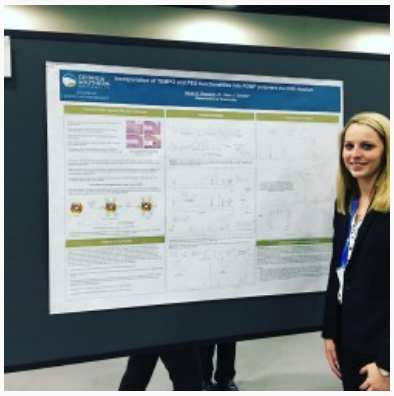

Sarah Roessler at the 2016 American Chemical Society National Meeting & Exposition in San Diego.

Sarah Roessler (chemistry '16) is on the leading edge of the search for blood substitutes administered in treating traumatic injuries. Her research on click reactions in certain polymers used in these substitutes is the focus of her thesis and a recent presentation at the American Chemical Society (ACS) in San Diego. Roessler's poster presentation in the Chemical Education Division (CHED) provided an overview of her research project, titled "Incorporation of TEMPO and PEG functionalities into ROMP polymers via click reaction."

This research focused on the development of ROMP (Ring Opening Metathesis Polymerization) polymers containing the functional groups 2,2,6,6-tetramethylpiperdin-1-oxyl (TEMPO) and polyethylene glycol (PEG). Both of these functional groups are known to have a detoxifying effect on cell-free hemoglobin and effect vasodilation in the bloodstream.

"This was interesting to me because, when bonded to cell-free hemoglobin, the polymers may be useful for the treatment of severe traumatic brain injuries as they convert the reactive oxygen species (ROS), in particular the superoxide anion, released by the cell-free hemoglobin into less harmful species," said Roessler. "Such modified hemoglobin solutions could be used as a blood substitute with a better shelf life than donor blood, also while possessing a high compatibility with any recipient."

Presenting at the conference gave Roessler the opportunity to meet many like-minded scholars in her field, including other individuals who were interested in the polymer aspect and the click reaction of her project.

"I encountered someone who was also working with click reactions, but to create dual-action antibiotics, which shows how important researching this type of method is for the future of healthcare," said Roessler. "I also met a representative from the University of Kansas who was interested in my research and approached me about graduate school."

In addition to networking opportunities, ACS provided Roessler with the chance to interact with vendors and companies looking to hire new graduates. One of her favorite parts of the conference involved exhibitors showcasing new technological developments related to scientific equipment.

"I was most fascinated by the laboratory robotics being developed to perform many advanced functions related to experimentation and research," Roessler said.

Perhaps one of the best perks of presenting research in San Diego was getting to experience the city itself. In her free time, Roessler visited such iconic spots as Coronado Beach and the San Diego Zoo, adding a touch of biology to an otherwise chemistry-centric trip.

"I am grateful for the opportunity to attend my first ACS National meeting and visit the beautiful city of San Diego," said Roessler. "This experience allowed me to appreciate the ability to network with peers and experts in chemistry and related disciplines as well as further broaden my appreciation for scientific research."

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