

December 2023



**LETOURNEAU
UNIVERSITY**

the **CHRISTIAN
POLYTECHNIC
UNIVERSITY**

AROUND THE CIRCUIT

ELECTRICAL & COMPUTER ENGINEERING (ECE) 2023 NEWSLETTER



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Welcome to the LETU ECE 2023 Around the Circuit Newsletter!

We are pleased to share with you the 2023 edition of the LETU ECE newsletter. Here, we provide an update on our community of students, faculty, and alumni at the Electrical and Computer Engineering Department of LeTourneau University.

The following pages summarize some of the ECE Department activities during the 2023 school year. This newsletter, however, is only a highlight of our recent

success stories. For further information concerning any item in this newsletter or concerning our educational and research programs, please contact ECE Department Chair:

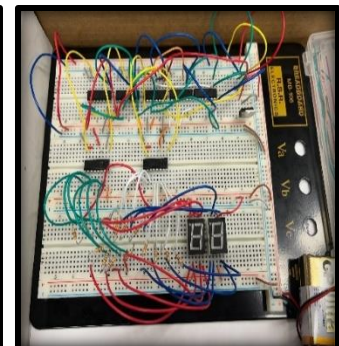
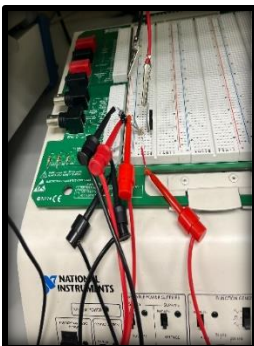
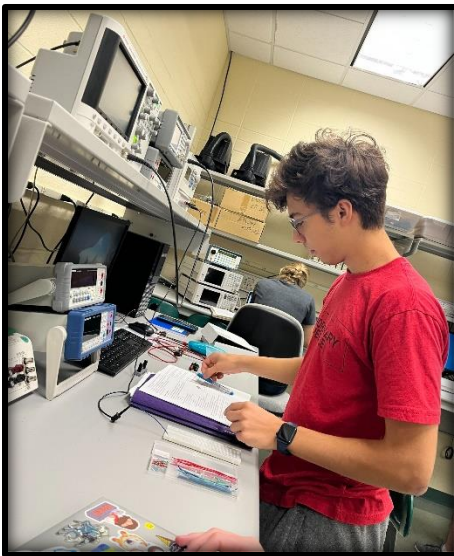
Joon Wan Kim, PhD | JoonwanKim@letu.edu

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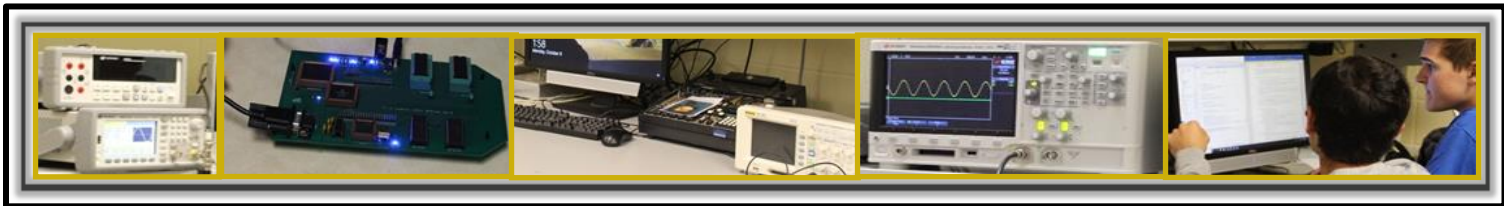
[Electrical Engineering Webpage](https://letu.edu/academics/engineering/electrical-engineering.html)

<https://letu.edu/academics/engineering/electrical-engineering.html>



Program Highlights

Electrical Engineering and Computer Engineering



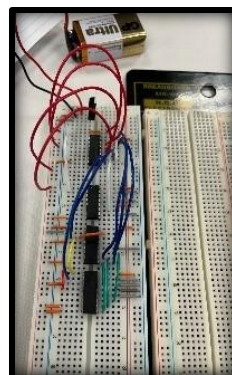
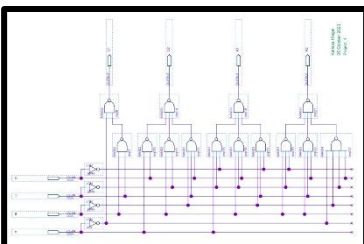
Students in our **Electrical (EE)** and **Computer Engineering (CpE)** departments have opportunities to work with faculty on innovative design projects. This academic year, three senior design projects were sponsored by companies that contributed more than \$44,000. Here is a brief overview of these projects:

1) LUSCE (LeTourneau University Smart Charging Exploration). Project Goal: To design and manufacture an innovative, portable, and solar-powered charging station for small electric vehicles.

2) LETS (LeTourneau ETL Team Stealth) by ETL. Project Goal: To evaluate and analyze original UAV's stealth capability and to deliver the proposed UAV design to improve and enhance stealth capability.

3) STARS (Starlink Tracking Antenna Reference System) by CTSI. Project Goal: To design, build, and test a system to track Starlink and other similar satellites through the sky and record their live-sky signals for offline processing and signal analysis.

Additional EE and CpE student projects included design and construction of: An autonomous robot to identify and chase troublemaking geese; a flight control algorithm for landing large, unmanned air vehicles on aircraft carriers; radio frequency transmitters; and an inexpensive medical device to measure hemoglobin saturation.



Program Highlights

Mechatronics

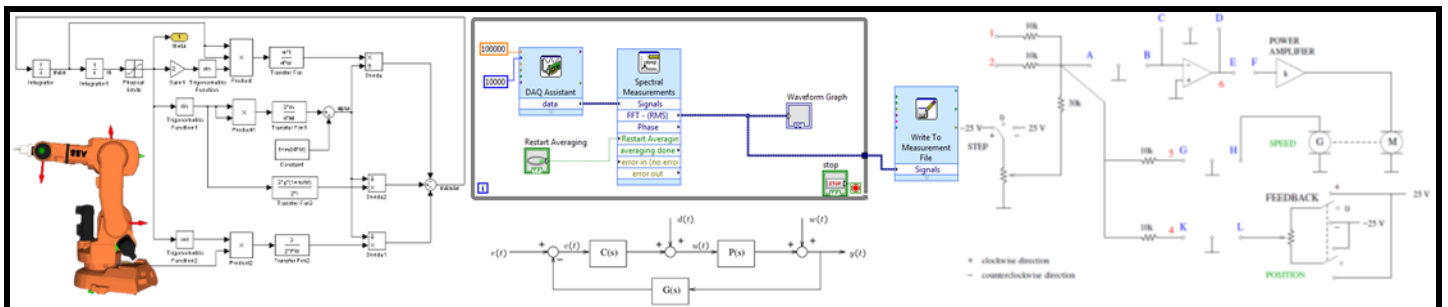
The **Mechatronics** program involves both theory and hands-on experience. Discipline-specific lab classes take place in two electronics labs, a microcontrollers lab, and a *new robotics lab*, which consists

of two URe3 robots, two R12 robots, one R18 delta robot arm, five heavy-duty carts, student desks, two 86" monitors, an instructor desk, and student workbenches. The new robotics lab is shown below (left).

Lab Facilities



Numerous software tools are used for **Mechatronics** classes and lab work. These tools include: MATLAB, Simulink, LabVIEW, and Multisim.



Program Highlights

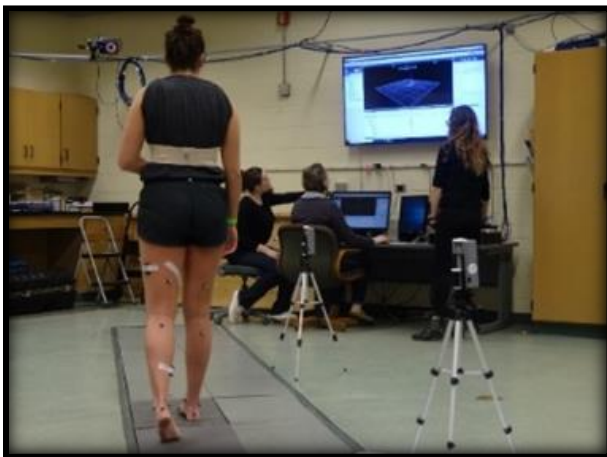
Biomedical Engineering (BME)

Biomedical Engineering courses include hands-on projects in musculoskeletal biomechanics and biosignal analysis using research-grade equipment that includes: Motion-capture cameras, force platforms, wireless electromyography sensors, treadmill, timing gates, and a biosignal acquisition system.

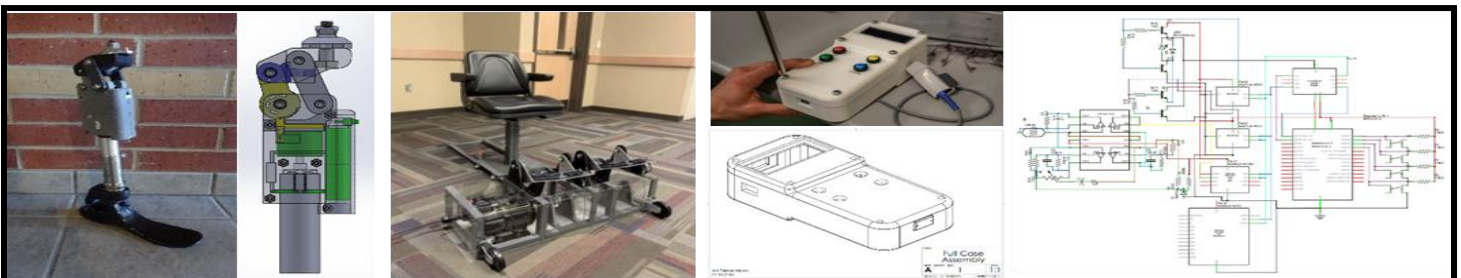
Students in the **BME** program also gain research experience in their junior Biomedical Engineering Research I & II and Senior Design I & II classes.

LETU BME students have presented in several national academic conferences (listed below) and gained recognition by winning student design competitions:

- Biomedical Engineering Society (*BMES*)
- American Society of Biomechanics (*ASB*)
- Engineering World Health (*EWH*)
- Rehabilitation Engineering and Assistive Technology Society of North America (*RESNA*)



Senior design BME students are working on the LeTourneau Rehabilitation Engineering Project 24 (LETREP24) to establish a wearable sensor system to monitor and log the range of motion of the human trunk for up to 48 hours.



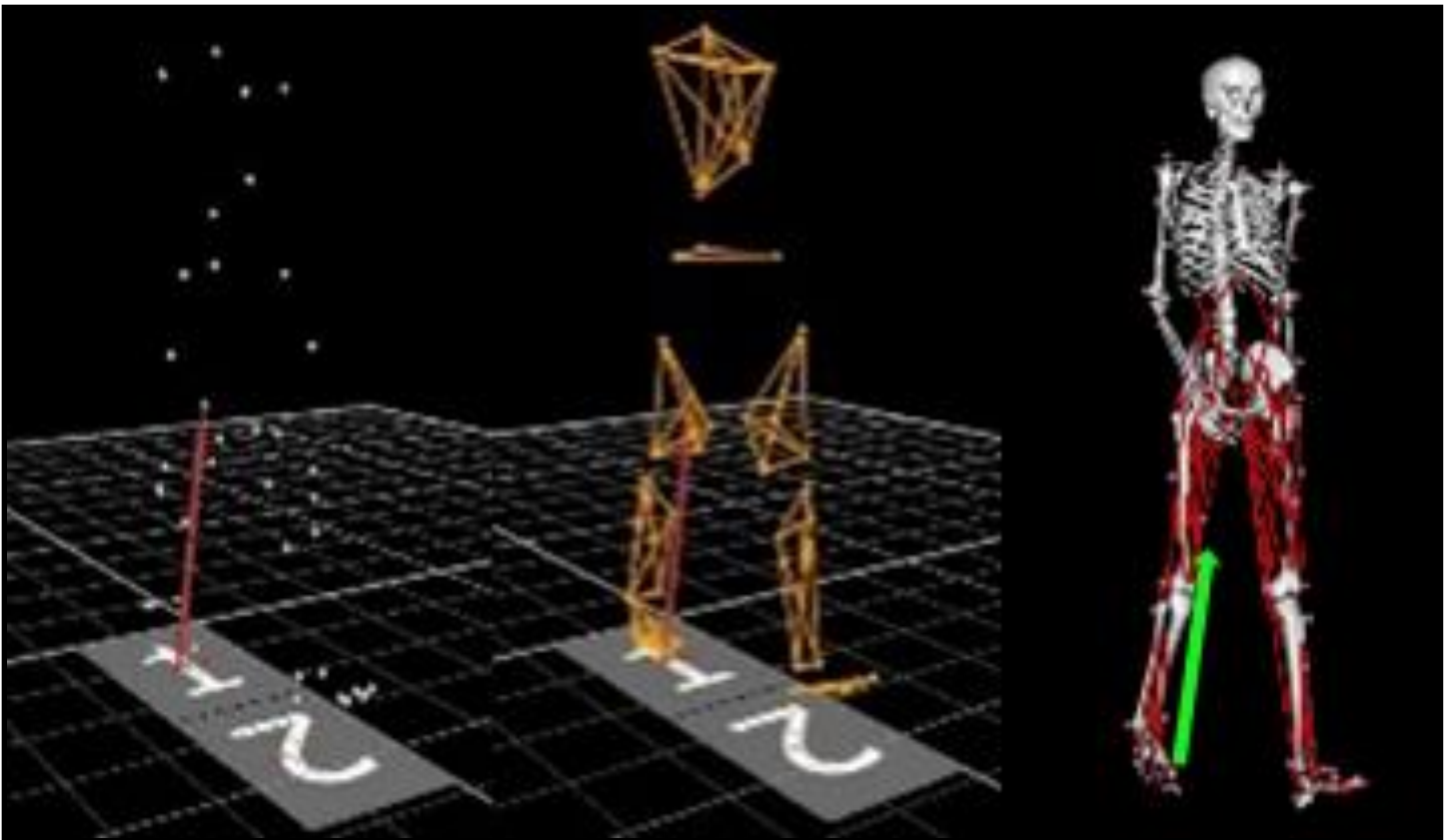
Upon graduation, LETU BME students receive a Bachelor of Science degree in Electrical and Computer Engineering (BSECE) with a concentration in **Biomedical Engineering**.

Program Highlights

Engineering Graduate Program

Any ECE undergraduate student with 60 credit hours and a 3.5 GPA or higher can apply for the “4+1” BS/MS graduate program. Undergraduates in the program take graduate courses and get a head start

on their MS degree in ECE. Upon graduating with their BS degree, these students continue for a 5th year to complete a master’s degree either with or without a thesis.



Faculty and Department News

ECE Faculty and Staff

Meet our 2023 ECE Faculty and Staff!



From left to right, top to bottom: Dr. Ko Sasaki, Dr. Marian Iordache, Dr. Paul Leiffer, Mr. Stephen Rollins, Dr. Hoo Kim, Prof. Oscar Ortiz, Dr. Andrée Elliott, Dr. Joon Wan Kim, Dr. Nathan Green.

Faculty and Department News

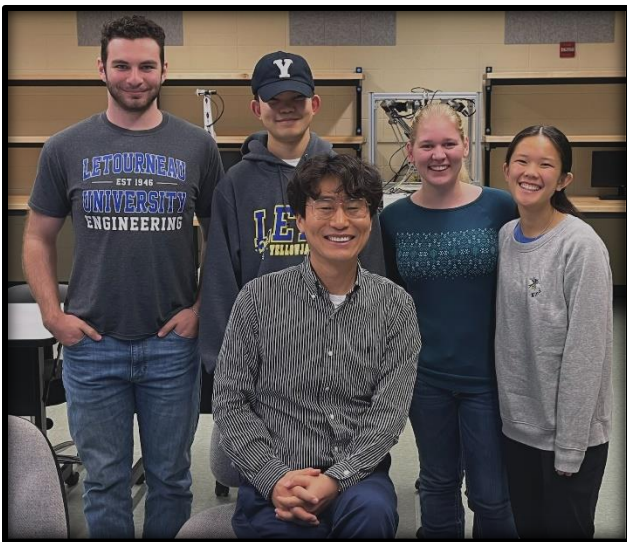
Dr. Joon Wan Kim – ECE Department Chair



LeTourneau University's ECE department chair and professor, Dr. Joon Wan Kim, has a dream: To make LETU's Engineering program become

one of the top 20 engineering programs on a national level. "While we have occupied the 28th place before, I dream of watching LeTourneau's Engineering program make it to the top 20s one day," he said. Dr. Kim believes LETU's ECE program distinguishes itself from

others in the nation because of our firm hands-on approach. "The fact that we also do senior design projects—which are sponsored by companies and/or the U.S. government—represents a superb opportunity for students to choose, based on their career paths, the skills they want to master," he said. "At LeTourneau University, our primary mission is to make of our students professional Christian engineers."



On Thursday, November 16th, Dr. Joon Wan Kim departed from Longview, Texas to travel to Siping, Jilin, northeast China where he will spend the remainder of the Fall 2023 semester. Dr. Kim will help teach classes at Jilin Normal University (JLNU) and potentially recruit students to attend LETU. His Digital Electronics class (pictured left) presented him a with card expressing well-wishes and included fond memories of him in their course.

Faculty and Department News

Faculty Grant Awarded



Dr. Hoo Kim



- **Dr. Hoo Kim** received a Rosa May Griffin foundation Grant (\$5000) with his proposal of “The LeTourneau University Machine-Learning STEM Competition for High School Students”.

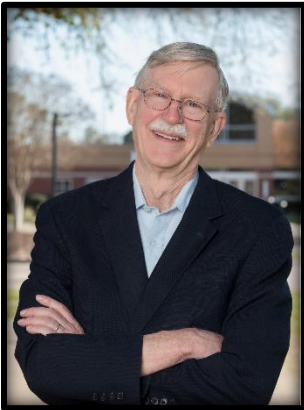


- **Dr. Hoo Kim** also received “The U.S. Air Force Research Lab Summer Faculty Fellowship Program (SFFP)” award for Pedagogy Research for Education in Electrical and Computer Engineering at the U.S. Air Force Academy.

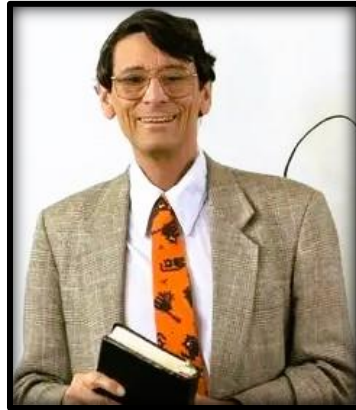


Faculty and Department News

Engineering Through the Lens of Faith



Dr. Paul Leiffer,
Professor Emeritus



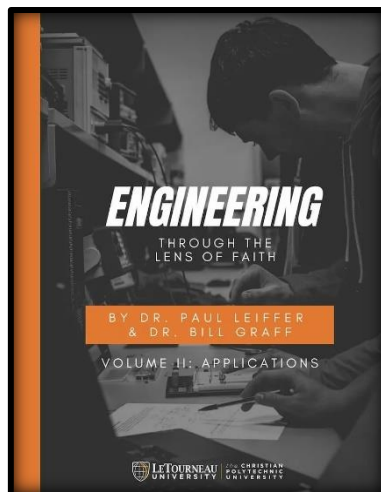
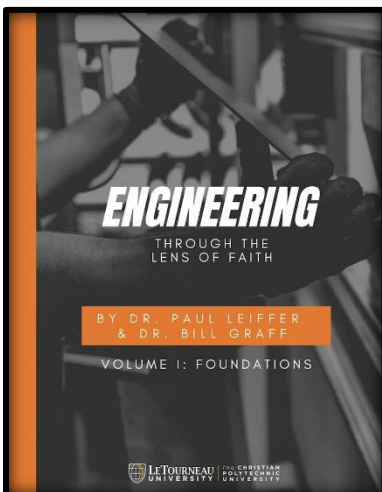
Dr. Bill Graff,
Professor Emeritus

Emeritus Professors Dr. Paul Leiffer and the late Dr. Bill Graff wrote a two-volume publication to tackle key questions that Christian engineers encounter in the workplace.

The book grew out of a series of classroom devotionals presented at LeTourneau University, coupled with various workshop and seminar presentations and conference papers.

Volume I deals with foundations: faith, truth, vocation, science, and mathematics.

Volume II deals with applications: ethics, technology, workplace, and missions.



It is the hope of the authors that their book will strengthen the reader's walk with Jesus and help to connect faith with vocation. The two volumes, along with appendices and discussion questions, are available for free at: <https://www.letu.edu/alumni/engineerlensfaith.html>

Student Recognition



Student Poster Competition April 2023

Savana Orton won 1st place in the IEEE Region 5 poster competition. Her poster presented the work of her senior design team which built a medical grade rehabilitation device.



Student Paper Publication/Presentation

Working with Dr. Joon Wan Kim, Savannah Orton

presented the paper: "Non-invasive respiratory rate detection using thermal imaging and facial recognition" at the March 2023 SPIE (The International Society for Optics and Photonics) Health Monitoring of Structural and Biological Systems conference held in Long Beach, California.

Student Recognition

LETU Rehabilitation Engineering Project 2023



Working with Biomedical Engineering professor, **Dr. Ko Sasaki**, LETU engineering students collaborated with the LETU Business Department to design and develop a medical-grade electro-mechanical rehabilitation device. The device is designed to be used by individuals with motor impairment due to neurological disorders. The group presented their device at the April 2023 *TCU Values and Ventures Competition*, and they placed as semi-finalists – 40th out of 240 accepted entries.

Student Recognition

Published Papers by Matthew Strong and Dr. Nathan Green



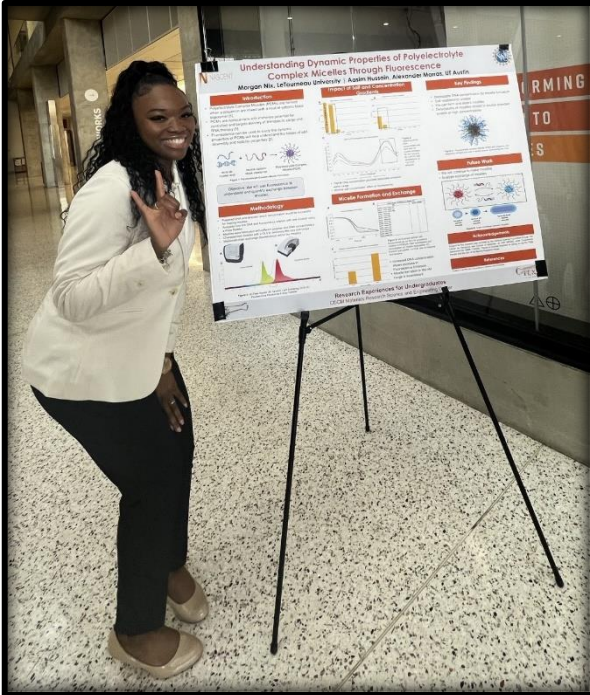
Published Papers

M. Strong, J. Miller, and N. Green “Tri-Band Inter-Frequency Group Delay Calibration,” 2023 IEE/ION Position, Location and Navigation Symposium (PLANS), Monterey, CA, USA, 2023, pp. 1033-1039, doi: [10.1109/PLANS53410/2023.10140115](https://doi.org/10.1109/PLANS53410/2023.10140115).

N. Green, “Experimental Validation of Generalized Integer Aperture bootstrapping,” 2023 ION Joint Navigation Conference, San Diego, CA, USA, 2023.

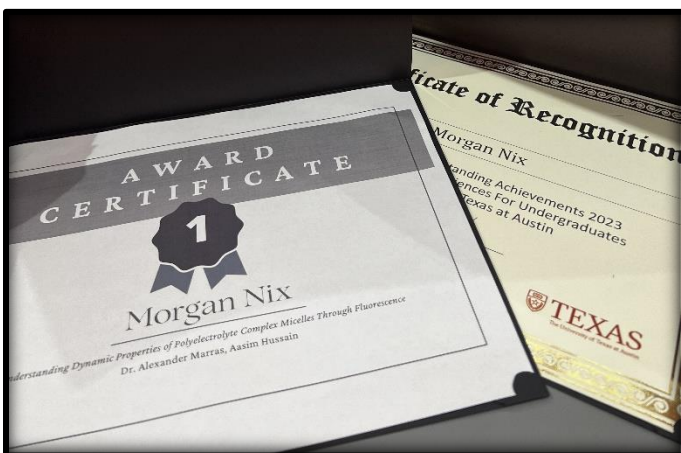
Student Recognition

Summer 2023 Award



Morgan Nix, a senior biomedical engineering student, won first place at the University of Texas (UT) 2023 summer poster symposium. The symposium was part of the Materials Research Science and Engineering Center program at UT Austin. Working with a graduate student mentor, Morgan characterized the kinetics of the fluorescence delivery of therapeutic nanoparticles.

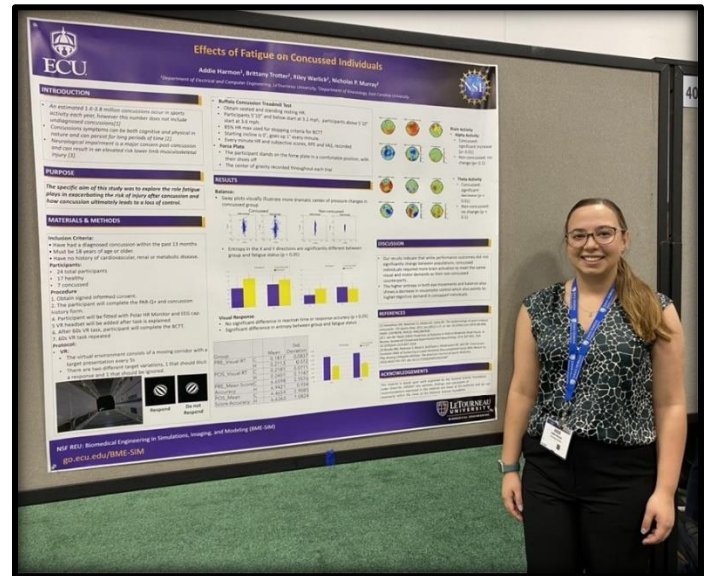
The poster symposium included many summer research projects and about 50 participating students who each presented his/her research.



Student Recognition

Summer 2023 Internship

Addie Harmon, a senior biomedical engineering student, participated in an NSF-funded (National Science Foundation) REU (research experience for undergraduates) program held at East Carolina University. Her project, entitled, “Effects of Fatigue on Concussed Individuals” is part of a larger ongoing study that is evaluating the long-term repercussions of concussion.



Addie presented her REU research project in one of the undergraduate poster sessions at the Biomedical Engineering Society’s (BMES) annual meeting in Seattle, Washington.

