EngiNews - Fall 2022

Welcome to EngiNews Fall 2022 issue. Feel free to reach out to us for any questions, concerns, and comments at Director of Engineering (Dr. Kaya, kayat@sacredheart.edu[1]) or the SHU EngiNews Editor (Kaitlyn Mangano, manganok@mail.sacredheart.edu).

Happy Fall. :)

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[1] mailto:kayat@sacredheart.edu

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New Engineering Professor

Joining the engineering faculty is Professor Okechukwu 'Okey' Ugweje! He was born in Nigeria, and came to the United States when he was only 21 years old. He received his bachelor's and master's degree from Southern Illinois University, where he studied Electrical Engineering. Afterward, he went to Florida Atlantic University where he got his Ph.D. in Electrical Engineering. Professor Okey has taught for over 25 years at over seven universities. Furthermore, between his teaching jobs, he has worked for NASA and the U.S. Airforce. His biggest takeaways from these were the love and passion he found for conducting research. Back in Ohio are his pride and joy, his three children and wife.

Why come to SHU? Well, he loves the innovative curriculum and feels he can produce more successful students by putting his own twist on things. Professor Okey plans to be an asset to the SHU Engineering team by assisting in getting the engineering department accredited. As he has prior experience helping schools get ABET accredited, we are in luck! This semester he is teaching Analog Circuits and Sensors and Robotics. So, if you need any assistance, you can contact him via email, phone number, or swing by his office, E-1136 during his office hours in East building.

Business Minor

Want to add a business minor?! Now you can! Speak to your advisor during your freshman or sophomore year about adding it. The best part is that if you took AP business classes in high school, they could count towards the minor. Once the Welch College of Business and School of Computer Science and Technology joined to become the Welch College of Business and Technology (WCBT), engineering faculty wanted students to have the opportunity to get a business perspective. This can easily be done by taking a management, economics, accounting, marketing, and finance course. Your electives as an engineering student can be made up of business electives, rather than engineering, if you so choose. This is a great opportunity for engineering students due to the different jobs you are opened to such as engineering management and project management. Having a business minor shows companies that you have an understanding of how a business is run and allows you to communicate better with business developers.

S-STEM Grant

The S-STEM Grant[2] donated by the National Science Foundation, gives students financial assistance, thus allowing them to attend Sacred Heart University. The NSF donated $1.5 million to be taken directly off tuition. This gives up to $9,500 per student per year for their four years. The grant is for six years. The money does not need to be paid back. To apply for this grant, you need to be a freshman in one of the six programs in the computer science and engineering school, have a high school and college GPA of at least 3.0, and be Pell-eligible. For the first three years, there will be eight students chosen per year. If you receive the grant, it is encouraged that you participate in community service as a paid internship by the grant. This can be done in Bridgeport, Connecticut, at a non-profit organization as a STEM mentor or back in your hometown. To apply, email Professor Tolga Kaya, kayat@sacredheart.edu[3], and Professor Kevin Bowlyn, bowlynk@sacredheart.edu[4].

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[2] https://www.nsf.gov/awardsearch/showAward?AWD_ID=2221113&HistoricalAwards=false
[3] mailto:kayat@sacredheart.edu
[4] mailto:bowlynk@sacredheart.edu

Embedded Systems

Taught each Spring semester in the engineering department is the Embedded Systems course. The word embedded means hidden, and the word system means using multiple components. This course focuses on computer systems which are made up of components such as microcontrollers. Students were tasked with three main projects throughout the semester. First, they programmed a small RC car to be autonomous. Therefore, the car could drive around and avoid obstacles on its own. They then built their own Arduino. This gave students the opportunity to solder. Lastly, they created a remote controller which used infrared rays. They were able to program a microcontroller to achieve this. Information learned in this course can be applied outside of SHU because any electronic device is an embedded system such as your car, dishwasher, and microwave. They all use microcontrollers!
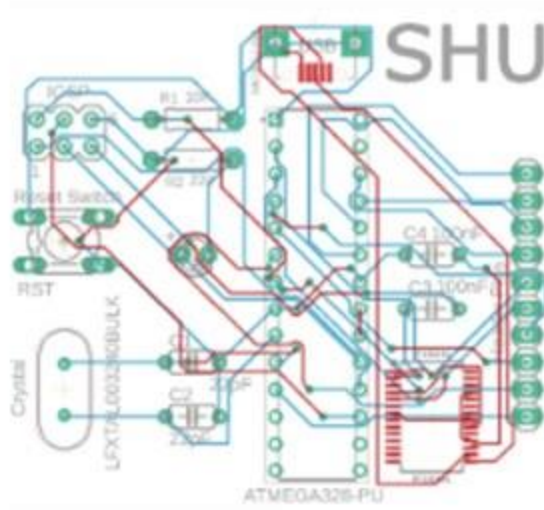
1 - Schematic of the Arduino designed by a student
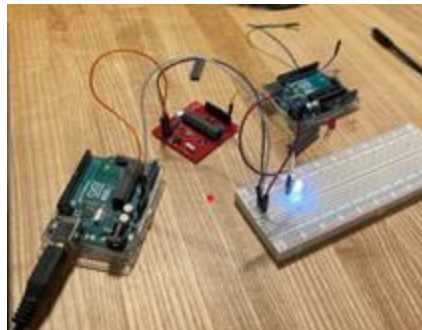
*2 - Circuit including Arduino's communicating with one another*

Engineering Explorations

Last semester, the Engineering Explorations course-built go-karts! They were able to race them in front of the West Campus guest house. Each student was individually timed to see who could go the fastest. The project began at the beginning of the semester in small groups of 3-5. Students were taught Fusion 360, a CAD software, which later allowed them to design a steering wheel and plaque. After, they were given a tiny wooden go-kart that was laser cut out to practice the assembly. Once they mastered this, they moved on to the full-size go-kart. Again, they were given precut wooden shapes to fit together like a puzzle. The wooden pieces were cut out on the Shop-Bot. During the assembly, students used mallets and sanders to get the wooden pieces to fit together. The go-kart needed to be a tight fit. Additionally, each group got to wire the powertrain and then install it into their go-kart. During this course, students' biggest take a ways were the Fusion 360 and teamwork.

During this project, students wanted to find a way to give back to the community. As a class, they voted on which non-profit they wanted to help. They voted on an organization who builds foster homes, Simply Smiles. Each student then reached out to the local community, including Sacred Heart faculty, via email to raise money for the non-profit. Students were able to raise $3000!

SHU Innovate
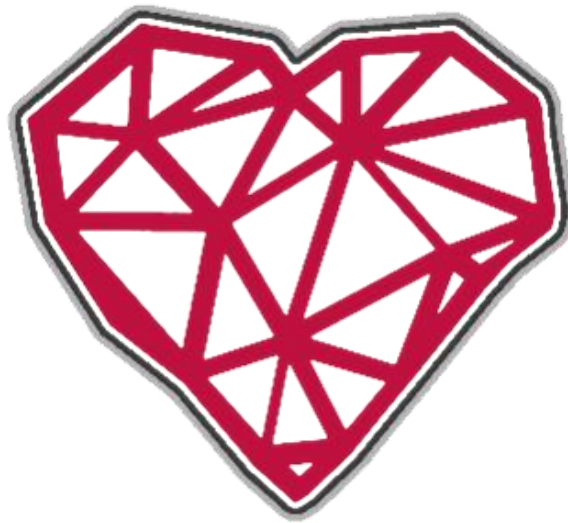
SHU Innovate is Sacred Heart's computer science and engineering club on campus. All majors are welcome, but they focus on activities geared towards those majors. In the past, they have hosted a coding night, robotics project, how to use GitHub, game night… The club began four years ago by two CS/engineering students, Charlie Escott, and Stephen Clarke. Their goal had been to offer career development opportunities, create a community, and generate interest in those who have not been previously exposed to computer science and engineering. SHU Innovate is also ACM and IEEE affiliated. Both are organizations of professionals working toward the development, implementation and maintenance of technology centered products and services. In the future, SHU Innovate strives to expand its club by hosting more events on main campus.

Formula SAE Go-Kart

Last year, the engineering students' senior project was to create a Formula SAE go-kart which they named "Road Kill". They were thrilled to have won 3 awards at the Annual Academic Festival: Provost's Prize, Best Technology Prototype, and Welch College of Business and Technology Dean's Prize. This year, the new seniors will continue with this project. The team consists of a lead/project manager, CAD designer, welder, and electronics specialist. Students are tasked with designing the chassis, constructing the powertrain, and a stress test of the vehicle. The students plan on approaching this project by first evaluating what last year's team did, then deciding whether or not they want to make adjustments to the designs. The greatest obstacle for them to overcome is the weight of the go-kart impacting the vehicle's speed due to the motor's size. Good luck seniors!

Recent Publications and Press Releases

Recent Publications

- **G. Bitencourt, E. Brown, C. Bleimling, G. Lai, A. Molki, and T. Kaya, "Autonomous Aerial Vehicle Vision and Sensor Guided Landing," IEEE International Conference of Electro/Information Technology, Mt. Pleasant, MI 48859, May 2021.**

This research was a collaboration between SHU Engineering and Quanser on our drone system. First international conference paper by our undergraduate students. Congratulations Gabe and Elijah.

- **B. Sahin, A. Acar, and T. Kaya, "Simple and low-cost synthesis of Al-doped ZnO/CuO composite nanowires for highly efficient hydration level sensing,"** *Ceramics International*, **47(8), 11405-11414, 2021.**

- **B. Sahin and T. Kaya, "Facile preparation and characterization of nanostructured ZnO/CuO composite thin film for sweat concentration sensing applications,"** *Materials Science in Semiconductor Processing*, **121, 105428, 2021.**

Both papers of Prof. Kaya's above explored the use of ZnO/CuO composite films to improve their sweat sensing performance for wearable devices.

- **K. Bowlyn and S. Hounsinou, "An Improved Distributed Multiplier-Less Approach for Radix-2 FFT," in** *IEEE Letters of the Computer Society*, **vol. 3, no. 2, pp. 54-57, 2020.**

Prof. Bowlyn worked with a collaborator in creating an improved multiplier-less structure for computing a radix-2 fast Fourier transform algorithm.

- **S. Dinc, B. Sahin, and T. Kaya, "Improved Sensing Response of Nanostructured CuO Thin Films towards Hydration Level Monitoring: Effect of Cr Doping,"** *Materials Science in Semiconductor Processing*, **105, 104698, 2020.**

Prof. Kaya worked with his collaborators in Turkey to create nanoscale devices for sweat detection purposes.

- **M. Raval and T. Kaya, "Effect of Multinational Projects on Engineering Students through a Summer Exposure Research Program," IEEE EDUCON, Global Engineering Education Conference, Porto, Portugal, April 2020.**

Prof. Kaya presented a conference paper on Prof. Raval and his students' 1-month research visit from India.

Press Releases

Turning Zs to Ws[5]

Prof. Tolga Kaya's research on wearables and sports analytics was featured on the SHU Magazine. This research is a collaboration between School of Computer Science and Engineering (Tolga Kaya, Samah Senbel, Diala Ezzeddine), Exercise Science (Chris Taber), Athletic Training (Julie Nolan), New York Institute of Technology (Sertac Artan), and Ahmedabad University (Mehul Raval, Srishti Sharma). A true

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[5]https://www.sacredheart.edu/news-room/news-listing/turning-zs-to-ws/

multidisciplinary project, it encompasses engineering, data analytics, and health of collegiate athletes who suffer from sleep deprivation.

Engineering Seniors to Work with Tech Companies[6]

Professor Kaya wanted engineering students to do something unique and meaningful for their senior project, so he reached out to companies to see if they needed help with a project. Kubtec, Quanser and ECM PCB Stator Technology all responded anxious to begin working with Sacred Heart seniors. Kubtec worked with students to show them the current design, development and manufacturing opportunity that can assist in the treatment needs of breast cancer. Quanser worked with students to create a new standard for engineering education using drones. ECM PCB Stator Technology wanted to improve motor technology for young individuals. Sacred Heart students helped by working with regenerative motors.

Sacred Heart Uses Its Resources to Help During Pandemic[7]

Sacred Heart invited first responders and health-care workers to stay in residence halls. They also offered to house tents on its campus for hospitals in need of extra space for its COVID-19 patients. In doing so, they were able to provide set-ups for the hospital's tent. Furthermore, they sent medical supplies to area hospitals.

Professor Tolga Kaya and Cedric Bleimling, IDEA Lab manager, took home 3D printers from the IDEA Lab to manufacture face shields. They also took part in an initiative to create ventilators.

Furthermore, Sacred Heart donated unused computer bandwidth to help researchers find potential cures for COVID-19. The universities IT department downloaded software provided by Folding@Home on computers.

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[6] https://www.sacredheart.edu/news-room/news-listing/engineering-seniors-to-work-with-tech-companies-/
[7] https://www.sacredheart.edu/news-room/news-listing/sacred-heart-uses-its-resources-to-help-during-pandemic/