



School of Engineering & Applied Sciences Newsletter

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LETTER FROM THE DIRECTOR

Dear SEAS Community,

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I hope that this message finds you well and that you are enjoying a fruitful time. As we dive into the spring semester, I am thrilled to share some exciting updates from the School of Engineering and Applied Sciences (SEAS).

First and foremost, the generous gifts from the Voilands and Hamricks have advanced the modernization of our engineering laboratory significantly. The acquisition of industrial-grade equipment and the refurbishment of essential resources will decisively benefit our students and expand their educational experiences. We are fortunate that such dedicated alumni and supporters understand the importance of providing the most modern tools and facilities to students so that they may excel in their future careers. The establishment of the hydraulics laboratory is another milestone in enhancing experiential learning, particularly for our civil engineering students. This hands-on facility will definitely empower our students and better prepare them for their academic and professional journeys.

The involvement of SEAS in the recently funded National Science Foundation Research Traineeship (NRT) program, 'NextGen Robotics Training,' underscores our commitment to cuttingedge research that tackles contemporary challenges. It is encouraging that our school is taking a leading role in the development of robotics and autonomous systems for environmental cleanup, restoration, and monitoring, a recognized critical research thrust. This initiative holds immense promise and reflects our commitment to the needs of industry and the broader community.

Furthermore, SEAS' involvement in the Institute for Northwest Energy Futures (INEF), with Noel Schulz and Yonas Demissie our SEAS colleagues as inaugural and assistant directors respectively, demonstrates our school's commitment to deliver education and research contributions in the field of energy and environmental sustainability.

As we reflect on the past year and the continued progress of the School of Engineering and Applied Sciences, we can conclude that our community's collective efforts, dedication, and support are driving us toward an even more impactful future. I look forward to witnessing the achievements and innovations that this new year will undoubtedly bring.

Thank you for your unwavering commitment to our mission. I encourage all of you to remain engaged, explore opportunities for collaboration, and continue contributing to the success of SEAS.

Changki Mo, Ph.D.

Academic Director of the School of Engineering and Applied Sciences

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School of Engineering and Applied Sciences

The School of Engineering and Applied Sciences (SEAS) offers bachelor's, master's and doctoral degree programs in computer science and civil, electrical and mechanical engineering.

All engineering programs at WSU Tri-Cities are accredited by the Engineering Accreditation Commission of ABET. The computer science program is accredited by the Computing Accreditation Commision of ABET. The school director is Dr. Changki Mo.



The school leadership consists of a team of program leads and student club advisors. The school also receives advice from its Industrial Advisory Board, IAB. The school programs are led by 15 full-time faculty members and 21 adjunct members and supported by an administrative manager and laboratory director.

Leadership

Changki Mo, Academic Director

Program Leads

Civil and Environmental Engineering: Yonas Demissie Computer Science: John Miller Electrical Engineering: Scott Hudson Mechanical Engineering: Joseph Iannelli

Academic Support

Academic Support Staff: Kimberly Vondell Harrod Engineering Technician III: Karl Wooster

Industrial Advisory Board

Civil Engineering committee: Paul Giever (CE committee chair), Pete Rogalsky (SEAS IAB chair), Alaa Aly Computer Science committee: Mahantesh Halappanavar, Neil Corrigan (CS committee chair) Electrical Engineering committee: Enio Montenegro, Jason Fuller (EE committee chair) Mechanical Engineering committee: Chad Hondrix, Karthik Subramanian, Lanco Stophons (ME committoo chair)

Chad Hendrix, Karthik Subramanian, Lance Stephens (ME committee chair)

Student Organizations & Advisors

ASCE (American Society of Civil Engineers): Prof. Akram Hossain ASME (American Society of Mechanical Engineers): Prof. Messiha Saad Coding Cougs: Prof. Luis De La Torre IEEE (Institute of Electrical and Electronics Engineers): Prof. Mohamed Osman ISA (International Society of Automation): Prof. Yuxin Yang Maker's Club: Prof. Che-Hao Yang Robotics Club: Prof. Scott Hudson SWE (Society of Women Engineers): Dr. Michelle Hendrickson

Momentum Newsletter Editorship

Editor in Chief: Prof. Joseph lannelli

Faculty Spotlight | LUIS DE LA TORRE

Luis De La Torre currently serves as an assistant professor of computer science in WSU's School of Engineering and Applied Sciences, having earned a Ph.D. in computing and information sciences and engineering from the University of Puerto Rico.



Professor De La Torre enthusiastically mentors and supports students in their STEM careers. As his chief educational strategy, over the years, he has actively involved students in his research projects. In this connection, professor De La Torre leverages his interest and expertise in using data-driven strategies to remove barriers to student retention and success.

He passionately celebrates diversity in the field of computer science and actively participates in conferences and student events, such as Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), DUCKHACKS, and CrimsonCode Hackathon. As the advisor of the Coding Cougs club, he takes pride in the club's recent victory in the T-Mobile track at DubHacks 2023, a hackathon event at the University of Washington. In recognition of his dedication and contributions to advancing WSU Tri-Cities' strategic plan, professor De La Torre has received several awards, including Length-of-Service Awards and the TRIO All-Star Award from the TRIO program at WSU Tri-Cities, as well as the TRIO Certificate of Excellence, as education and research are not his sole pursuits.

Professor De La Torre has made several scholarly contributions in several computer science areas such as software vulnerabilities, cloud computing, distributed systems, genetic algorithms, optimization problems, and divisible load scheduling. He actively collaborates with the Pacific Northwest National Laboratory and the University of Puerto Rico-Mayaguez in research projects related to efficient clustering of software vulnerabilities, cost-efficient cloud computing resource allocation, and machine learning models for hyperspectral identification of plastics. His most recent research student, Kayaty Panchal, has earned a master's degree, excelled in her career endeavors, and joined Washington River Protection Solutions.

Recently published research works included: 1. De La Torre, L., Halappanavar, M., "Scaling Optimal Allocation of Cloud Resources Using Lagrange Relaxation." Proceedings accepted for the 26th Workshop on Job Scheduling Strategies for Parallel Processing (JSSPP 2023), Tampa, FL, USA, 2023. 2. Panchal, K., Das, S., De La Torre, L., Miller, J., Halappanavar, M., "Efficient Clustering of Software Vulnerabilities using Self-Organizing Map." Presented at the 2022 Virtual IEEE International Symposium on Technologies for Homeland Security, November 14 - 15, 2022.



Faculty Spotlight | CHE-HAO YANG

An assistant professor in mechanical engineering, professor Che-Hao Yang is serving as a co-principal investigator (Co-PI) in a research project entitled "Enhancing Sustainability in Packaging: Transforming Paper Mill Sludge and Kraft Lignin into Tailored Bioplastic Composites." Having received substantial funding totaling \$400,000 from the Department of Energy, this initiative emphasizes the training of graduate students to tackle the challenges of synthesizing bioplastic composites for various packaging applications, such as those in the food and shipping sectors.



Professor Yang engages students in design and fabrication projects. The projects enable students to think outside the box, as it were, and most importantly complete real-world projects by applying the knowledge that students gained in the courses taught by professor Yang, such as computer aided design, component design, and manufacturing process. For both undergraduate and graduate students, he also introduced bioplastic related projects based on an injection molding manufacturing process to address novel material properties improvement.

Thus far, professor Yang's research has yielded 14 articles that have been published in leading peer reviewed journals and conference proceedings in his field. This publication success reflects the recognition and appreciation of his research by fellow experts. To illustrate further, professor Yang's research has been welcomed in prestigious publication venues such as the IEEE Transactions on Biomedical Engineering, which boasts a significant impact factor of 4.424 and ranks third in the field of biomedical technology. Setting him apart from his peers, professor Yang's publication record in esteemed journals underscores the superior quality of his research.

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Year in Review | 2022 - 2023

Commencement

The Spring 2023 Commencement was held at the Toyota Center in Kennewick on May 6. Diplomas were conferred to as many as 64 School of Engineering and Applied Sciences graduates. This graduating class consisted of six individuals with Bachelor of Science in civil engineering degrees, 16 individuals with a Bachelor of Science or Bachelor of Arts degrees in computer science, 15 individuals with Bachelor of Science in electrical engineering degrees, 17 individuals with Bachelor of Science in mechanical engineering, eight master's graduates, and two Ph.D. graduates. At the commencement, the SEAS gonfalon carrier was Austin Clement, a civil engineering graduate.



Named outstanding seniors were Karissa Zimmerman, civil engineering; Francisco Lopez, computer science; Ethan Padden, electrical engineering; and Mason Machart, mechanical engineering.

Welcome, Goodbye to Staff

We welcome Kimberly Vondell Harrod, who has joined SEAS as the school's new administrative assistant. At the same time, we say good-bye to Karl Wooster, SEAS' laboratory technician who has accepted an employment offer with a regional company. We are sorry that he is leaving, but wish him well in his new job.

Awards & Recognitions

Thus spoke SEAS' students! Based on their teaching evaluations, the outstanding 2022-2023 Academic Teachers of the Year were professor Joseph lannelli, mechanical engineering and professor Messiha Saad, mechanical engineering. Their enthusiastic mission is SEAS's faculty's mission: to graduate profession-ready students for leadership in our societies.







Michelle Hendrickson, one of SEAS' adjunct faculty members in civil and environmental engineering received the 2023 WSU Tri-Cities Outstanding Adjunct STEM Faculty Award, which was endowed with a donation from Peter Smith, former WSU Tri-Cities interim vice chancellor for finance and administration, who recognized the importance of adjunct faculty to our campus. The WSU Tri-Cities Outstanding Adjunct STEM Faculty Award recognizes an adjunct faculty member who exemplifies high-quality teaching in science, technology, engineering and mathematics related academic programming. This award includes a personalized gift and a monetary award.

SEAS contributes to robotics research through WSU's NRT-LEAD Program

SEAS professor Scott Hudson, electrical engineering; John Miller, computer science; and Changki Mo, mechanical engineering are members of a WSU multidisciplinary team conducting applied robotics research supported by a National Science Foundation Research Traineeship (NRT) grant. The NSF funded program entitled, "NRTFW-HTF: Convergent Next-Generation Robotics Training: Leadership, Entrepreneurship, and Adaptive Design amid a Changing World of Work" (NRTLEAD), arrives at a time when a flood of new technologies including robots, autonomous systems and artificial intelligence promise to transform the workplace. The NSF funding will advance robotics research and help to educate 52 doctoral and master's students in engineering and science with an interdisciplinary emphasis in entrepreneurship and applied psychology.



Led by principal investigator Prashanta Dutta, professor of mechanical and

materials engineering on the WSU Pullman campus, the program spans five WSU locations and several colleges, involving faculty from the Everett, Pullman, Tri-Cities, and Vancouver campuses as well as the WSU Prosser Extension site. Leveraging longstanding relationships with leading Washington State businesses and government agencies in the areas of fruit orchard automation, nuclear waste cleanup, and underwater operations, the NRT-LEAD program is educating next-generation engineers and scientists working at the interface of human-robotics technology. Graduate students will receive unique interdisciplinary training across engineering, computer science, applied psychology, and business. They will take courses and engage in field work that helps them understand more incisively what researchers call the "human-machine interface". Through this program, WSU has developed an innovative graduate certificate program in robotics and autonomous systems to address workforce and industry needs.

The Tri-Cities based researchers are developing new knowledge to tackle the existing and future needs of skilled operators and developers of autonomous and robotic systems for environmental cleanup, restoration,



and monitoring. They are focusing on the applications of robotics to nuclear environmental remediation, as SEAS' faculty have developed specialized expertise in the ongoing cleanup of the Hanford Nuclear Site. They are also developing machine-based solutions such as an autonomous platform for nuclear waste monitoring through robots equipped with cameras and sensors to automate inspection of nuclear containers. Contractors working on the Site, such as Washington River Protection Solution, Atkins, and PNNL, are receiving assistance from SEAS's researchers to develop new technologies to facilitate the removal of the semi-solid waste from the storage tanks and to demonstrate the effectiveness of robotic-based cleanup approaches for the Hanford Site.

Scan to read the full article, "Graduate training in 'robot-human interface' awarded National Science Foundation grant," by Sara Zaske, WSU News & Media Relations.



Adjunct faculty revamps civil engineering laboratory

Michelle Hendrickson, the recipient of the 2023 WSU Tri-Cities Outstanding Adjunct STEM Faculty Award, a chemical engineer at Washington River Protection Solutions (WRPS) and instructor at WSU Tri-Cities, enhanced a senior civil engineering course and fostered students' success.

"CE 416 — Hydraulic Engineering Laboratory is a required course for all WSU civil engineering students," Hendrickson explained. "About a week before the spring



From Left: Michelle Hendrickson, CE 416 Students, HiLine Engineers

semester began, I learned that 10 WSU Tri-Cities students would have to travel to the Pullman campus once or even twice a week to complete the course." Hendrickson knew the students and realized that those weekly trips would negatively impact both their studies and their ability to work part-time. She offered to teach the lab, even though it would be the first time the class had ever been organized by WSU Tri-Cities. Despite efforts to procure the necessary equipment, it was apparent the lab would not have everything needed in time. That's when Hendrickson started thinking "outside the box," and took advantage of WSU Tri-Cities' spirit of innovation and an area flourishing with industry professionals and engineering opportunities. Thus, CE 416 became a vision of not simply bringing real-world applications into the lab, but of bringing the lab into the real working industrial world. Hendrickson knew that such a vision could not be completed alone. "I started reaching out to other engineering staff here at WRPS. Folks like Whitney Blaak, Doug Kennedy, Mike Erhart, Doug Hendrickson, and Jason Engeman," added Hendrickson. "They offered advice about how to approach certain activities, and pointed me toward other sources for assistance."

Over the course of the lab, students ventured under bridges to monitor stream flow in the city of Richland. They learned about water hammer and surge analysis with Applied Flow Technology modeling software — the same software that WRPS engineers are starting to use to model some systems in the field. At WSU Tri-Cities, Karl Wooster, the former engineering lab technician, spent countless hours working with Hendrickson on the CE 416 lab, cobbling together equipment from local hardware stores, making custom pieces and a flume so that the students could run various experiments on campus.

The final week of the course focused on pump characteristics. The lab exercise was the product of a partnership with HiLine Engineering & Fabrication in Richland. HiLine was in the process of testing a vertical turbine pump intended for installation in the A Pit of Tank AY-101. The class visited the HiLine facility and familiarized themselves with both the pump and the testing apparatus. A HiLine mechanical engineer then helped the students obtain pump data so they could develop a pump curve.

Again, this activity — developed through close partnership and collaboration — delivered a real-world application of information that the students have learned in the classroom. "I really believe others were so willing to help because they understand the importance of fostering the next generation of STEM professionals," said Hendrickson, reflecting on the success of the lab. "Others and I are trying to help capture the interest of students in employment to support the future Hanford cleanup and closure operations, and society as a whole. Without the help of WSU Tri-Cities, my fellow WRPS employees, HiLine, the city of Richland, and AFT modeling engineers, CE 416 would not have been successful."

Civil engineering students earn national certification

Last summer, six civil engineering undergraduate students and one graduate student became nationally certified by the Alliance of Hazardous Material Professionals TM/ Institute of Hazardous Materials Management (IHMM) as Student-Certified Hazardous Materials Managers (ST/CHMMs).

Michelle Hendrickson, CHMM, PE taught Civil Engineering 419/519 – Hazardous Waste Treatment/Management during the summer semester at WSU Tri-Cities. The three-credit class that covers the "principles of operation and application of processes in design of technologies used in hazardous waste treatment and remediation." However, Dr. Hendrickson expanded the topics of the course to include relevant laws



and regulations, and best management practices in order to prepare students to pass the Student Certified Hazardous Materials Manager's national exam. All students passed the exam during the mid-term and as a result were not required to take the final exam.

In addition, the students collaborated with WSU Tri-Cities Environmental Health and Safety to complete a hands-on class project. For the project, the students cleaned out the WSU Tri-Cities' Food and Environmental Quality Lab, creating a comprehensive inventory of the chemicals while dispositioning glassware, appropriately disposing of archived samples, recommending which chemicals should be reclaimed/repurposed, and properly staging and segregating various chemicals and wastes in accordance with chemical compatibility and health and safety requirements. A state contracted third party collected and disposed of the remaining chemicals and waste later in the fall. Additionally, the students generated documentation regarding the scope of the project, work instructions and a health and safety plan that specified the use of appropriate personal protective equipment. Once the chemicals have been reclaimed/ repurposed by other faculty for student laboratory and research purposes and wastes dispositioned, the lab will be re-assigned for various uses.

Society of Women Engineers student chapter established at WSU Tri-Cities

Following the growth of SEAS programs and with support of the WSU Office of Student Engagement and Leadership, a student chapter of Society of Women Engineers (SWE) has been established at WSU Tri-Cities.

For more than six decades, SWE has provided women engineers with a unique place and voice within the engineering industry. The SWE organization is centered around a passion for our members' success and continues to evolve with the challenges and opportunities reflected in today's exciting engineering and technology specialties.



We welcome the Society of Women Engineers to WSU Tri-Cities and look forward to supporting the advancement of the SWE mission to support women in all stages of their STEM careers. For more information, please contact the WSU SWE faculty representative and Eastern Washington SWE Professional Chapter member, Dr. Michelle Hendrickson, CHMM, PE at <u>Michelle_Hendrickson@wsu.edu</u>.

WSU Tri-Cities participates in Women in STEM Education Network

WiSEN (Women in STEM Education Network) is a co-mentoring network for historically underrepresented and marginalized graduate and undergraduate women students in STEM. The WiSEN project engages students in structured conversations, identifies their mentoring needs, and calls out the systemic barriers that hinder women's participation in STEM. WiSEN also seeks to expand upon best STEM mentoring practices while building a national networked community for minoritized women students. The project is supported by a grant from the National Science Foundation. Jillian Cadwell, research associate and SEAS adjunct professor is the project lead for WSU Tri-Cities. The initial phase of this project will design, develop, and launch WiSEN among four higher education institutions, Rochester Institute of Technology, University of Montana, Washington State University Tri-Cities, and Gonzaga University. Each partner university will have a WiSEN group with eight spots available for women in STEM students. The WiSEN group on the WSU Tri-Cities campus currently has a waiting list. Contact Jillian Cadwell at jillian.cadwell@wsu.edu for more information about the WiSEN program.

WSU Tri-Cities selected to join regional direct air capture hub

WSU Tri-Cities along with 12 other organizations from across various clean-energy sectors have been awarded \$3 million by the US Department of Energy (DOE) to study the feasibility of a regional hub for direct air capture (DAC), carbon mineralization, and carbon management in eastern Washington and neighboring states. The participants were convened by the clean energy nonprofit RMI organization, the carbon mineralization company Carbfix, and the Pacific Northwest National Lab (PNNL). Ankeron Carbon Management Hub plans to bring together DAC and carbon dioxide mineral storage technology developers for a regional DAC hub to develop in the Pacific Northwest. The project will deliver a feasibility study, which builds on the combined experience of Carbfix and PNNL, as well as Carbfix's experience with DAC and storage integration and commercial operation in Iceland. Jillian Cadwell, SEAS's adjunct professor of civil engineering is the lead for this project. Research opportunities for WSU Tri-Cities student will be posted soon. Contact Jillian Cadwell at jillian.cadwell@wsu.edu for more information about the DAC projects.

Read full article at arctictoday.com or scan to read online:

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Civil engineering research and graduate education expand

Professor Yonas Demissie received a one-year research contract with Washington State Department of Agriculture to design a sampling and monitoring system for groundwater pesticide pollution in Washington state. The contract will financially support a PhD student for 12 months and cover one month of his salary. Additionally, Demissie and professor Sarah Roley, a faculty member in WSU's School of the Environment received another one-year research grant from the Washington State Water Center to study the effectiveness of season rotation of farming and wetlands to improve water quality in Washington. The grant will financially support two graduate students from civil engineering and the School of the Environment for about a year. In recognition of his contributions to the civil engineering program, professor Demissie received the WSU 10 years-of-service award.

A new global master's program in civil engineering has been approved. Conceived by professor Akram Hossain and directed by professor Yonas Demissie, <u>the program emphasizes environmental engineering</u> and has already received applications from prospective graduate students.

WSU Tri-Cities is continuing to develop new academic programs, research collaborations, and entrepreneurial activities in clean energy and climate innovation, including a research-based course with industry mentors and incubator integration aimed at engaging, retaining, and empowering students. Based on a Departmen of Energy Inclusive Energy Innovation Prize and led by Jillian Cadwell, SEAS adjunct professor of civil engineering and research associate, these clean-energy initiatives have led to the Clean Energy Ambassadors Network (CEAN). Opportunities for students and mentors to participate in CEAN will be posted soon. For further information, contact Jillian Cadwell at jillian.cadwell@wsu.edu.

Scan to learn more about the <u>environmental engineering</u> program:

Computer science students join engineering students in special graduation ceremony

Each spring just before commencement, graduating engineering students are honored in a ceremony called the Order of the Engineer. Graduating computer science students have longed for a similar event. For the first time ever, last April, WSU Tri-Cities held the Pledge of the Computing Professional to honor these students. The Pledge of the Computing Professional and The Order of Engineering were integrated into one expanded ceremony to celebrate all graduating students in the School of Engineering and Applied Sciences. The expanded ceremony was presided by professor Joseph lannelli and enriched by remarks from professor Kathleen McAteer, vice chancellor for academic affairs. The ceremony was then immediately followed by the SEAS graduation celebration for the 2023 graduating class. This celebration was presided by professor John Miller's acoustic guitar solo.



School of Engineering & Applied Sciences



Students Rachel Forsberg and Gabriel Antunez presented their project "Next Generation Tank Level Detector" prototype at the 2023 WSU Tri-Cities Research Symposium.

SEAS Design Prizes

Pavan Thallapragada, director of research and development and advanced reactors, at Framatome-IB (Lynchburg, VA) initiated the SEAS Senior Design Competition Prizes with \$300 and will collect more funds from other companies. The SEAS faculty will evaluate all SEAS senior design project presentations at the WSU Tri-Cities' Research Symposium and present awards to students during the spring semester.

SEAS Outstanding Student Awards

The following students were recognized at the Voiland College of Engineering and Architecture Convocation held on April 14, 2023

- Outstanding Sophomore: Razan Osman, Civil Engineering
- Outstanding Junior: Mary Workman, Mechanical Engineer
- Outstanding Senior: Ethan Padden, Electrical Engineer
- Outstanding Research Assistant: Ezekyel Ochoa, Mechanical Engineer

Aerodynamics Student Project

We have successfully unveiled the "Gale Wind Tunnel" in WSU Tri-Cities' Fluid Mechanics Laboratory. The tunnel resulted from a student project entitled "Design and Construction of a Computerized Subsonic Wind Tunnel," which was assigned in our ME306 -Thermal and Fluids Lab course and completed by Kameron Markham, a mechanical engineering graduate who showcased his project at the 2023 WSU Tri-Cities Research Symposium. This project aims to create an affordable and portable subsonic wind tunnel that can be used as a versatile platform for research and educational applications.

This wind tunnel is equipped with a range of sensors, including an anemometer, pressure sensors, temperature sensors, load cells, and an integrated smoke-wire system that enables flow visualization. Additionally, the tunnel features a fully computerized operation and data acquisition system, driven by a control unit named "WindOS."



Senior student Kameron Markham presented his project at the 2023 WSU Tri-Cities Research Symposium

Student Spotlights

Aron Powers

A SEAS mechanical engineering graduate, Aron Powers now serves as a licensed engineer in training who primarily works on the design of fluid systems in nuclear facilities. As a Bechtel National full time employee, he is currently contributing to the design of the High-Level Waste (HLW) facility at the Waste Treatment Plant in Hanford, WA, the largest radioactive waste treatment plant in the world. In his first eight months at Bechtel, he has contributed to the sizing of HLW vessels and wash rings and performed utility assessments to support the reintegration of HLW to the water and gas systems that currently support Direct-Feed Low Activity Waste (DFLAW) operations. He looks forward to widening his responsibilities at the facility,



both to expand his technical knowledge and to help protect the Columbia River from Cold War era defense waste. Powers' next professional milestones are to earn his professional engineer license and expand his foundational knowledge of industrial fluid systems. Prior to his employment at the Waste Treatment Plant, Powers worked at Pacific Northwest National Laboratory as an intern. During his tenure, he assisted building engineers with both long and short term tasks such as the curation of HEPA filter information, fire protection and panic hardware walkdowns, and the identification and procurement of spare parts to ensure continuation of critical research at the laboratory.

Originally from Burbank, Washington, just due east of Pasco, Powers graduated in the top five of his high school class and attended Columbia Basin College under their Running Start program. After earning his high school diploma, he continued to attend Columbia Basin College to complete engineering prerequisites. Upon fulfilling them and earning an AA degree, he transferred to WSU Tri-Cities with a scholarship from the Washington Society of Professional Engineers. While at WSU Tri Cities, Powers worked with the Gear Up program where he provided both after school and classroom assistance in math and science to middle school students at Burbank Middle School. He then earned a Bachelor of Science in mechanical engineering degree in the spring of 2021, graduating summa cum laude. In his culminating senior design project, he contributed to help Framatone to analyze specialty bolts on their nuclear chemical conversion reactors.

Thereafter, in the fall of 2022, he earned a Master of Science degree in mechanical engineering. In his master's thesis, under the supervision of Messiha Saad, his graduate advisor, he analyzed the lighting and mechanical systems in WSU Tri-Cities' Floyd and East buildings for potential energy savings. Using web crawlers coupled with room data sets that were individually recorded for each space, Powers was able to show that a combination of new LED technology and occupancy sensors could save approximately 350 MWh in a year, the equivalent of 62.4 tons of carbon dioxide from a gas-fired power plant, while breaking even from capital costs in a short time. The lighting portion of his thesis work was published in <u>Sustainability</u>.

Beyond work, Powers enjoys woodworking, reading, and volunteering at schools. During National Engineers Week 2022, Powers visited Leona Libby and Highlands Middle School in West Richland and Kennewick respectively to speak with middle school students about engineering as a profession.

Scan to read his thesis published in Sustainability:



School of Engineering & Applied Sciences

Jackie Kelly

In the movie The Truman Show, the main character has been living a life that was mostly chosen for him, through a structured environment and careful indoctrination. Anytime he feels that something might be off, he is placated and redirected. When he finally chooses to trust himself, he overcomes the storm that threatens to sink him and joins the real world to find himself.

This story resonates with Jackie Kelly's experience. Kelly is an electrical engineering undergraduate at WSU Tri-Cities. Because of her upbringing, Kelly thought that her usefulness as a woman was capped at having children and raising them. She felt a nagging dissatisfaction with her life but was

determined to excel at being a stay-at-home mom. But when life threw her a curveball three years ago, she realized she had a choice: survive or thrive. Eventually, Kelly chose to thrive. She applied to WSU's electrical engineering program and has been basking in the glow of learning, growing, and thriving ever since. Kelly has loved the electrical engineering program at WSU, particularly her power engineering courses. She also enjoyed thermodynamics so much that she added a minor in mechanical engineering. She has received several scholarships from generous sponsors, including Schweitzer Engineering Laboratories and IEEE Power & Engineering Society.

Every day, Kelly looks around her and feels immense gratitude for the opportunities she has been given and the wonderful community she finds herself in. She works hard and is determined to succeed in the new life she is pursuing for herself and her four children. Her wish is that when her three daughters see what she has accomplished, they will know exactly what a woman is capable of. The answer is: anything.

Zhibin (Harrison) Yang

Harrison Yang earned his Bachelor of Science and Master of Science in mechanical engineering at the University of Dayton. In his master's degree thesis, he defended his original design of an orthogonal testing fuel for combustor operability testing. Yang followed Joshua Heyne to Richland when he was hired as the director of the Bioproducts, Science & Engineering Lab. Yang is now pursuing his PhD in mechanical engineering.

Yang's research focuses on prescreening sustainable aviation fuel (SAF) candidates, which informs novel SAF producers of risks to meeting jet fuel approval criteria. This work lowers the technology readiness level at which

meaningful information can be provided to fuel producers. At WSU, Yang serves as the point of contact for prescreening SAF at WSU. He has received more than 190 SAF samples from more than 30 institutions, including academic, national labs, and private sectors. He has published 14 peer-reviewed archival publications, two conference proceedings, and one book chapter. Recently, Yang and his advisor, Joshua Heyne received the 2023 EPA Green Chemistry Challenge Award led by Kim Tutin at Captis Aire, one of the novel fuel producers with whom they have been collaborating. Beyond SAFs, Yang enjoys hiking, riding motorcycles and scuba diving. He also holds a private pilot license, which allows him to perform sightseeing flights by plane.





Christina Lansing

Christina Lansing, a WSU Tri-Cities second-year mechanical engineering student, was awarded a \$12,000 fellowship to participate in a pioneering study and research abroad program between WSU and Sweden's Linkoping University (LiU); the program is being led by SEAS' professor Joseph lannelli. "Christina is a gifted WSU Tri-Cities mechanical engineering student completing a computer science minor and is comfortable with other languages, including German and Norwegian," said lannelli. Selected by WSU and LiU professors, Lansing completed her fellowship program in Sweden this fall.

Lansing said she applied for admission into the Sweden exchange and research program so she could deepen her computer science understanding, learn in a new environment, and participate in cultural activities to learn more about Sweden. "Building an international network could potentially create new job possibilities for my future and makes future travel significantly easier," explained Lansing, a Tri-Cities native whose parents are both mechanical engineers and graduates of WSU Tri-Cities.

"Growing up, I enjoyed problem-solving and working with my parents to design and repair things around the house, leading me to be interested in mechanical engineering as a career," said Lansing, Through her classes and internship at Pacific Northwest National Laboratory, Lansing discovered her interest in Computer Aided Design (CAD) and hopes to secure a CAD focused job after graduation.

Kameron Markham

At WSU Tri-Cities, Kameron Markham recently earned a Bachelor of Science degree in mechanical engineering. In high school, he helped to start a FIRST Robotics club and rose through the ranks to captain during his junior and senior years. He also played the trumpet and participated in several band competitions. During his time at WSU Tri-Cities, he helped start the Makers Club and invested a few years designing and constructing a computerized wind tunnel. The wind tunnel is nine feet in overall length, has a clear test section, and is equipped with several sensors and an interactive user interface to improve ease of use and integrity of data. Initially a student project, the fabrication of the wind tunnel became an opportunity to replace

project, the fabrication of the wind tunnel became an opportunity to replace an older wind tunnel in the Thermal and Fluids Laboratory. Installed at WSU Tri-Cities, Markham's wind tunnel is now being used in undergraduate classes to familiarize new students with fluid mechanics. After graduating, Markham remained in the Tri-Cities and is now employed at the Pacific Northwest National Laboratories as a fulltime mechanical engineer working with autonomous robotics and unmanned aerial systems such as drones. His job integrates several different fields, including mechanical design, system engineering, and programming. He is also pursuing becoming a PNNL-certified drone pilot as well, which will allow him to take the controls during flight days.





Coding Cougs

Supervised by professor Luis De La Torre as faculty advisor, the "Coding Cougs" is a SEAS computer science student club that promotes computer programming on the WSU Tri-Cities campus. A team of four Coding Cougs students won <u>first place with</u> <u>their project at DubHacks</u>, a collegiate hackathon event held on the University of Washington campus. Over two days, the SEAS team competed against 741 individuals



who developed 177 projects. Coding Cougs President, Reem Osman, led the victorious SEAS team in Seattle.

The team consisted of computer science students Christian Penick, James Thomas Brittain, Dietrich Zacher, and Danyil Kovalchuk. Named "RealmDialer," the team developed a project that creates an in-game item for Minecraft. The item allows players to make phone calls from within the game using T-Mobile's "Your Number



Coding Cougs president, Reem Osman, Front and Center, takes a team selfie on the way to Seattle.

Anywhere." The creation of the project involved all team members, who were required to learn new software for its development. The creators hope to take the project further by developing the ability to accept calls, create a currency to fund calls, and connect the virtual and real worlds through video calls within the game. "We want to express our sincere gratitude for the support in making our journey to DubHacks 2023 possible. The event enabled students from diverse majors, including computer science, digital technology and culture, biology, and business, to gain valuable resumebuilding experiences. We are eager to continue this tradition and encourage more students to participate," said the Coding Cougs president.

Scan to learn more about the Coding Cougs winning the DubHacks competition:



Rocket Club

A group of mechanical engineering and electrical engineering students joined forces to form a rocket club. The club aims to inspire students from diverse backgrounds to apply their engineering skills to real-world challenges, fostering a spirit of innovation and practical creation. Last fall, the club students diligently worked on a project titled "Designing a Thrust Vector Controlled (TVC) Rocket at Model Scale;" a 3D-printed TVC module is shown in the picture. This challenging project was presented at the 2023 WSU Tri-Cities Research Symposium, offering these students a unique opportunity to immerse themselves in the exciting field of rocket and aerospace engineering. With professor Yuxin Zhang as the faculty advisor, the Rocket Club will be expanded to establish on our campus a Tri-Cities student chapter of ISA (International Society of Automation). The ISA student club will recruit students interested in rockets and automation.



From Left to Right: Rocket Club Members Trent Butcher, Dan Hamilton, Colton Weitz, and Maks Karazhbei at the 2023 WSU Tri-Cities Research Symposium.



International Programs from WSU to the World

Several European Union study and research abroad programs for the whole WSU system are being led by SEAS' professor Joseph Iannelli, based on external U.S. and European funding that has exceeded \$700,000 over the past few years.

SEAS' professor, Joseph lannelli is leading several European Union study and research abroad programs for the whole WSU system. Funding for the programs comes from external U.S. and European sources and has exceeded \$700,000 over the past few years.

These programs pursue three objectives:

- 1. Establishing international partnerships to advance knowledge more effectively than allowed by the resources of any single institution.
- 2. Graduating internationally-minded diverse students for leadership in multicultural global societies.
- 3. Securing transatlantic funding.

In turn, these objectives reflect the WSU System strategic-plan goals of:

- **1. Research, Innovation, and Creativity** Grow the global impact of WSU's research by building additional partnerships with leading universities abroad.
- 2. Student Experience Ensure every WSU student can participate in study abroad programs.
- **3.** Outreach, Extension, Service, & Engagement WSU to become a national leader in advancing quality of life through meaningful engagement in discovery and education with partners throughout the world.

Professor lannelli's vision is to increase the number of diverse WSU students who study overseas for one semester, by also providing them with financial support that removes the financial barriers experienced by some students who wish to participate in these programs. In 2023, professor lannelli with professor Shelley Pressley, associate dean for student success, secured funding from the Scan Design organization, a private foundation that fosters the expansion of international relations between the United States and Denmark. This funding will provide three \$6,310 fellowships for WSU students in environmental sustainability to study and conduct research in Denmark in fall 2024.

Students selected for the program will continue to pay tuition to WSU, but will not pay any tuition in Denmark. There, the student will enroll in classes to earn academic credits that are then transferred to WSU and applied to the student's degree requirements so that the student's graduation is not delayed. Interested students should communicate with professor lannelli at joseph.iannelli@wsu.edu for further information. With professor lannelli as PI, the Sweden Scientific Computing study and research abroad program in fall 2023 supported eight students from two colleges and four different WSU campuses. The students studied at Linköping





University (LiU) and conducted scientific computing research that focuses on the computer-based design philosophy supporting Boeing's and Saab's co-designed and coproduced T-7A Red Hawk training aircraft. At LiU the students enrolled in classes to earn academic credits that are transferred to WSU and applied to the student's degree requirements, so that the students may graduate on time.

The program is sponsored by NSF's IRES program, with funding totaling \$300,000 over three years. Each participating student receives a \$12,000 fellowship, while fulfilling tuition commitments to WSU but paying no extra tuition in Sweden. Several applications for the fall 2024 offering of the program have already been received. Students who would also like to apply for participation in this transformative program are invited to communicate with professor lannelli.





WSU Tri-Cities' Institute for Northwest Energy Futures appoints inaugural director and assistant director

By Lacey Desserault, WSUTri-Cities NEWS

Noel Schulz has been appointed the inaugural director and Yonas Demissie the assistant director of WSU Tri-Cities' Institute for Northwest Energy Futures (INEF). Schulz's wealth of experience and expertise in the fields of engineering and energy and Demissie's background in water, climate change, and energy will advance INEF as the institute that helps to further establish the Tri-Cities as a sustainable energy hub for the state of Washington and the nation.



Earlier this year, the state approved \$7.7 million for the 2023-25 biennium to hire researchers and staff and secure a new facility to house the institute. The institute will hire eight scientists and engineers – five, including the director, will be located at WSU Tri-Cities, and three will be at WSU Pullman. The WSU Tri-Cities scientists will bring experience in energy data analytics, social impacts, life cycle assessment, and techno-economic analysis.

Click to read the full article to learn more or scan:

For more information about INEF and WSU Tri-Cities, visit tricities.wsu.edu/inef

Private gifts enable renovation of WSU Tri-Cities' Engineering Laboratories

By Max Eberts, WSU NEWS

Washington State University Tri-Cities' School of Engineering and Applied Sciences has been upgrading major components of its engineering lab thanks to a generous \$200,000 investment from Doug and Julia Hamrick. The Hamricks' gift is providing much-needed equipment, including 3D printing machines used for prototyping, a Charpy impact tester (measures the energy level required to fracture material), and digital hardness testers and laser cutters required in today's manufacturing processes.

The Hamricks' support builds on a \$50,000 investment by Battelle, the operation managers of Pacific Northwest National Laboratory (PNNL),



Doug and Julia Hamrick

which initiated momentum for the upgrades by funding an automated, computerized numerical-control (CNC) lathe. In addition, leading WSU philanthropists Gene and Linda Voiland made a gift of \$55,650 for the purchase of a CNC mini mill and other equipment. All together, these gifts provide \$305,650 toward the upgrade. "Julia and I have seen WSU Tri-Cities answer the area's growth with talented, well-prepared graduates," said Hamrick, "and this lab will elevate WSU's game."

Click here to read the full article to learn more or scan:



Before the upgrade, WSU Tr-Cities engineering students had to work with many outdated tools in the engineering lab.



The upgrade made the latest technology available to WSU Tri-Cities students. Here Trevor Peterson, an undergraduate mechanical engineering major, operates the new CNC mini mill.

Undergraduate Programs

Civil Engineering^{B.S.}

Civil engineers advance communities by designing and maintaining crucial infrastructure, preserving the natural environment, and improving the quality of life for all. Owing to their knowledge of mathematics and science, civil engineers plan and design all elements of the built infrastructure, such as bridges, buildings, highways, railroads and water systems. tricities.wsu.edu/engineering/civil \mathcal{O}

Computer Science ^{B.S.}

Computer scientists elevate societies' cyber infrastructure, from smart-device apps to the Internet. In WSU Tri-Cities' computer science program, students learn to design software and networks, mastering computer graphics, scientific computing and programming environments. As computer science impacts virtually every industry in today's technological world, computer science graduates are in high demand from employers in the Tri-Cities region and throughout the State of Washington.

Cybersecurity ^{B.S.}

The Cybersecurity program graduates computer scientists who can secure and protect cyber infrastructures, from networks to the Internet, as these professionals are eagerly sought by industry. After acquiring foundational computer science knowledge, students learn crosscutting concepts and skills in confidentiality, integrity, privacy risk, adversarial thinking, and security analytics.

tricities.wsu.edu/cybersecurity

Electrical Engineering ^{B.S}

Electrical engineers conceive and design the electrical technology that drives 21st century systems, from computers and smart devices to power generation stations, wireless installations and aerospace autopilots. Our degree program educates students on all aspects of the profession through industry internships, laboratory experiences, and courses that emphasize circuits, electromagnetic fields and waves, digital signal processing, power systems, and microprocessors. tricities.wsu.edu/engineering/electrical

Mechanical Engineering ^{B.S.}

Mechanical engineers advance the technologies that impact our societies, from robotic systems and alternative generators to stronger materials and safer cars and airplanes. Through their education in engineering mechanics, thermodynamics, fluid dynamics, mechanical energy, and engineering materials, graduates elevate myriad industries, such as automation, engines, health care and manufacturing.

tricities.wsu.edu/engineering/mechanical

"The WSU Tri-Cities electrical engineering program was exactly what I was looking for. It feels like a small community where everyone gets along. Every one is helpful. It's also easy to get involved in different clubs and activities. It's a great fit."

Cynthia Castillo

Electrical Engineering Alumna



Have Questions? Contact Us!

Office of Undergraduate Admissions 509-372-7250 tricities.admissions@wsu.edu tricities.wsu.edu/admissions

Office of Graduate Programs & Research 509-372-7394 niamh.oleary@wsu.edu tricities.wsu.edu/engineering

Graduate Programs

Chemical Engineering M.S., Ph.D.

Faculty research broadly emphasizes three areas: sustainable energy systems, biomolecular engineering, and biomechanics. Within these areas projects are focused on chemical and biological catalysis and kinetics; chemical and biological fuel cells; biofilm engineering; novel sensor technologies; cardiac and reproductive molecular engineering; and molecular, cellular, and musculoskeletal mechanics. The graduate programs are flexible, allowing students to develop a program that fits individual needs. A Master of Science is typically completed in 1-2 years. voiland.wsu.edu

Civil and Environmental Engineering M.S., Ph.D.

Our programs provide a solid foundation in advanced civil engineering and science combined with technical expertise in specialized areas that are advanced by the CEE faculty members, who are recognized experts in their respective disciplines. They lead academic instruction and research activities in clean water systems, environmental health preservation, contaminant transport modeling, groundwater flow, hydraulics, and water resources. tricities.wsu.edu/engineering/graduate/civil \mathcal{Q}

Computer Science M.S., Ph.D.

Our computer science programs systematically build a body of knowledge of theories and models leading to advanced solutions to real-world computing problems, including safeguarding cyberspace, developing large-scale software systems, and enhancing smart devices. Current research activities of our faculty members encompass artificial intelligence, machine learning, object-oriented scientific computing, parallel computing, and position tracking for robotic systems.

tricities.wsu.edu/engineering/graduate/computerscience

Electrical Engineering M.S., Ph.D.

The electrical engineering graduate programs elevate the regional economy. Students graduate as technology innovators who expand research that impacts societies, such as making solar energy more economical and developing smart wireless systems. Our research activities include electromagnetics, navigation of autonomous vehicles, telecommunication, and thermal transport in nanostructures.

tricities.wsu.edu/engineering/graduate/electrical

Mechanical Engineering M.S., Ph.D.

In our graduate programs, students acquire professional skills and learn mechanical engineering topics at the frontier of current knowledge in order to tackle challenging real-world problems. Students conduct in-depth research in emerging and advanced areas of mechanical engineering, including additive manufacturing, smart materials, and space flight. Research areas encompass aerodynamics, CFD, energy harvesting, high-performance engineering and scientific computing, nuclear engineering applications, renewable energy, robotics and automation, and sustainable aviation fuels. tricities.wsu.edu/engineering/graduate/mechanical



From undergraduate to doctorate and everything in between you might just find that your

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