SPRING 2020

MESSENGER

MECHANICAL ENGINEERING | UNIVERSITY *of* WASHINGTON

Engineering during COVID-19, *Pages 4-5*

CHAIR'S MESSAGE

RESILIENCE + INGENUITY

Many of us are drawn to mechanical engineering specifically because of its hands-on nature. While the discipline has grown increasingly focused on data and software-driven advances, the act of carrying a design into a working prototype is not only one of the most important things we teach, it's also one of the most rewarding and enjoyable aspects of our coursework.

So, as the end of winter quarter and entirety of spring quarter have been moved completely online to help stop the spread of the novel coronavirus, the impacts on the department have been uniquely felt. But against that backdrop it's been inspiring to see our faculty, staff and students rise to the challenge, both applying our expertise to develop life-saving solutions and carrying on with our education mission.

In this issue you'll read stories about some of the ways we've quickly adapted in spring quarter, including efforts to confront the surging need for medical supplies, how our instructors and students are handling coursework online, and a student company's win in the all-virtual Environmental Innovation Challenge. Along with them are other stories that demonstrate the essential nature of mechanical engineering, one about a heart tissue experiment that spent a month this spring aboard the International Space Station and another about the ways ME faculty are teaming up with the Institute for Nano-Engineered Systems to work at the nanoscale. We look forward to returning to our labs and classrooms to continue these kinds of important research projects and, as always, deeply appreciate your ongoing support.

Per Reinhall
Mechanical Engineering Chair

DIAMOND AWARDS

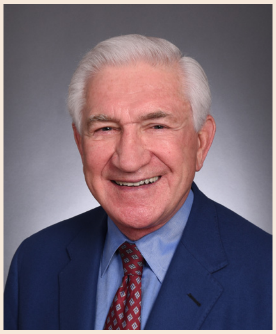
Join us in congratulating two ME alumni on being honored this year for achievements by the UW College of Engineering with 2020 Diamond Awards.

Allen Israel

'68 BSME, '71 MBA, '78 JD

Dean's Award

Attorney Allen Israel has navigated complex legal projects such as representing Paul G. Allen in the purchase of the Seattle Seahawks, and gifts to name the Paul G. Allen School of Computer Science & Engineering and the Allen Center.



James "Jim" Skaggs

'59 BSME

Distinguished Achievement in Industry

Jim Skaggs directed NASA's Apollo Program and transformed a struggling defense company to a $1.4 billion acquisition. Now CEO and chairman of Aminex, he is leading efforts to bring an immunotherapy cancer drug to Phase 1 human trials.

Learn more about the Diamond Awards at engr.uw.edu/da

Department news

College of Engineering Associate Dean for Academic Affairs and ME professor **Brian Fabien** has been named dean of the University of Portland's Shiley School of Engineering, effective July 1. We are grateful for his many years of leadership and accomplishments in research, teaching and service at UW.

ME faculty **Jonathan Posner** and **Jeffrey Lipton** were named to UW Medicine's COVID-19 Innovations Task Force.

Professor **Dayong Gao** was elected as a fellow of the American Society of Mechanical Engineers (ASME), a fellow of the American Institute for Medical and Biological Engineering (AIMBE) and received an International Society for Biological and Environmental Repositories (ISBER) Special Service Award.

Professor **Steve Shen** received recognition from ASME in recognition of five years of service as editor of the *Journal of Thermal Science and Engineering Applications.*

Professor **Junlan Wang** received the 2020 M.M. Frocht Award from the Society for Experimental Mechanics (SEM) for outstanding achievement as an educator in the field of experimental mechanics.

AeroSpec, a startup led by ME doctoral candidate **Jiayang (Joe) He**, will receive $25,000 in funding from the Jones + Foster Accelerator at the UW Foster School of Business.

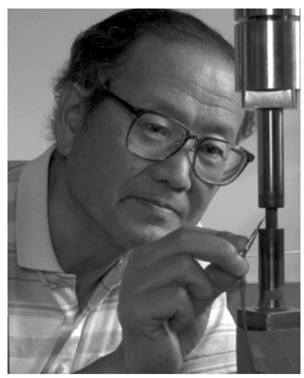
Professor **Jonathan Posner** was awarded seed funding from the Global Innovation Fund from the Office of Global Affairs for his cookstove-related BURN injury investigations in Nepal and Ghana (BURNING).

ME doctoral candidate **Abigale Snortland** was awarded a Graduate Research Fellowship from NSF to support her research on marine turbine hydrodynamics.

Remembrances

Professor Emeritus James Chalupnik

Professor Chalupnik served a long and distinguished career in the ME department, starting as assistant professor in 1964 and ending as a professor emeritus when he retired in 1995. He was a renowned expert in acoustics and noise control and involved in numerous environmental and machine noise management projects nationally and locally. He taught undergraduate and graduate courses in acoustics, dynamics and vibrations throughout his 31 years at the UW. He passed away on Jan. 14, 2020.



Professor Emeritus Minoru Taya

Professor Taya was a kind and brilliant man and an outstanding scholar and innovator who joined the ME department in 1989 and was appointed professor emeritus when he retired in 2019. He was the first holder of the Nabtesco Endowed Chair, a fellow of ASME and a member of the Washington State Academy of Sciences. Taya's research spanned many sub-disciplines including elasticity, solid mechanics and materials science and engineering. He made seminal advances in ferromagnetic composite shape memory alloy actuators, semi-conductor organics, energy harvesting, and nanorobotics for diagnosis and treatment of cancer. He also served as the chair of ASME Materials Division's executive committee and as an editor of the *Journal of Applied Mechanics, Mechanics of Materials* and the *Journal of Composite Materials.* Taya passed away on Jan. 4, 2020.

Left: Thanks to startup funding, the AeroSpec team will continue to develop their real time air quality monitoring system. Photo by Mark Stone / University of Washington

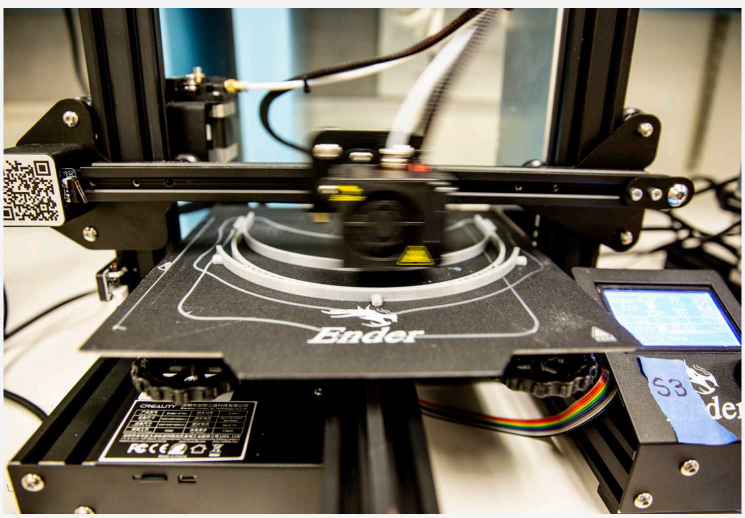
Together we will

UW fabrication engineers help meet the rising need for supplies to protect medical staff and treat patients with COVID-19

By Andy Freeberg
Photos by Dennis Wise / University of Washington

Soon after the potential impacts of the novel coronavirus became apparent in the Seattle region, UW Medicine knew a major concern would be having sufficient personal protective equipment (PPE) to keep healthcare workers safe. Responding to their call, specialists in digital fabrication and manufacturing from across campus quickly mobilized, lending their expertise and facilities.

Through the Center for Digital Fabrication and the Solheim Additive Manufacturing Lab, ME researchers have been collaborating with UW Medicine, the Paul G. Allen School of Computer Science & Engineering and other colleagues from academia and industry to meet with front-line providers and innovate PPE — including face shields, masks and medical gowns — so that hospitals can remain well-supplied. These photos highlight some of their ongoing efforts, all of which are in various stages of validation, approval and dissemination for use around the world.



Above: In conjunction with an effort driven by UW Medicine, 3D printers across campus busily worked to manufacture cradles to hold face shields. More than 1,000 were delivered with a substantial number contributed by ME.

Above: Graduate students Daniel Revier and Kelly Mack cut UW-designed medical gowns on ME's digital fabric cutter. The gowns are the first disposable isolation gown designs vetted by the FDA and shared through the NIH 3D print exchange with simple instructions for how to make them in other communities in need of protective gowns.

Below: 3D printing isn't the only way to quickly go from design to product. Here ME professor Mark Ganter uses casting to make a face shield cradle. Innovating with other manufacturing techniques like injection molding and vacuum forming will be critical for industry to ramp up PPE production.

Masks may be the most well-publicized of COVID-19-related medical PPE. The UW Center for Digital Fabrication (DFab) has been working on a number of projects to validate, design and prototype them. These include filtered surgical masks (shown here), respirator masks and non-rebreather masks.

ME assistant professor Jeffrey Lipton (left) works with graduate student Soumya Jindal to prepare a study of medical mask design. As a co-director of DFab and member of the UW COVID-19 Task Force, Lipton has been a leader in UW's effort to confront medical PPE supply challenges.

Mechanical goes virtual

This spring, the UW transitioned to a fully online education model in light of COVID-19, requiring instructors to quickly adjust and implement their courses remotely.

Undoubtedly, the requirement has been a challenge. Instructors scrambled to gather drawing tablets, test software and recreate lesson plans. Meanwhile students have had to navigate a very different learning environment. Student engineering competitions, a highlight of the year, have been canceled or changed to design-based formats.

But engineers are problem-solvers, and amidst the difficulties, many of ME's faculty, staff and students have stepped up with determination and creativity.

Engineering Innovation in Health

One of ME's major capstone programs, EIH's year-long curriculum typically culminates during spring quarter with a functional prototype. Without access to campus labs and facilities, this year's EIH students have been given more flexibility in their final projects.

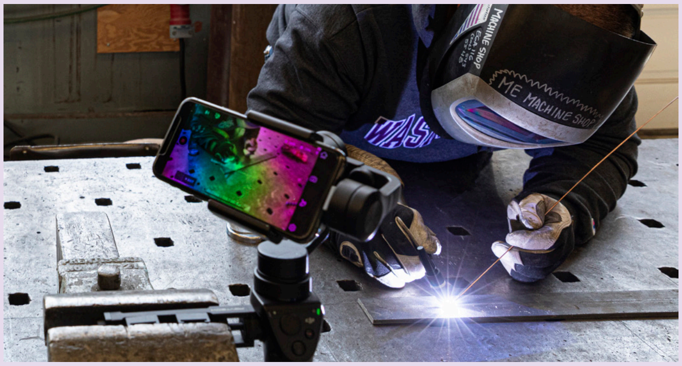
Yet many students have persevered, dividing up duties and setting up at-home work benches, 3D printers and testing systems to carry on with their prototypes. "We understand how impactful our solution could be in bettering the lives of others, and frankly the entire class was just itching to build, construct and execute," says ME senior Shayla Payne. "It's important to acknowledge the disappointments associated with what we no longer can do, but it's even more important to find what we still can do, because that list is longer!"

ME355 – Introduction to Manufacturing Processes

When it became clear even lab classes would need to be conducted virtually, ME instructional technicians Eamon McQuaide and Reggie Rocamora knew they had a tough situation. One of their primary responsibilities is to train students on machine shop tools, a lab component that's very hands-on and typically enjoyable for ME students, and also a requirement for many to graduate.

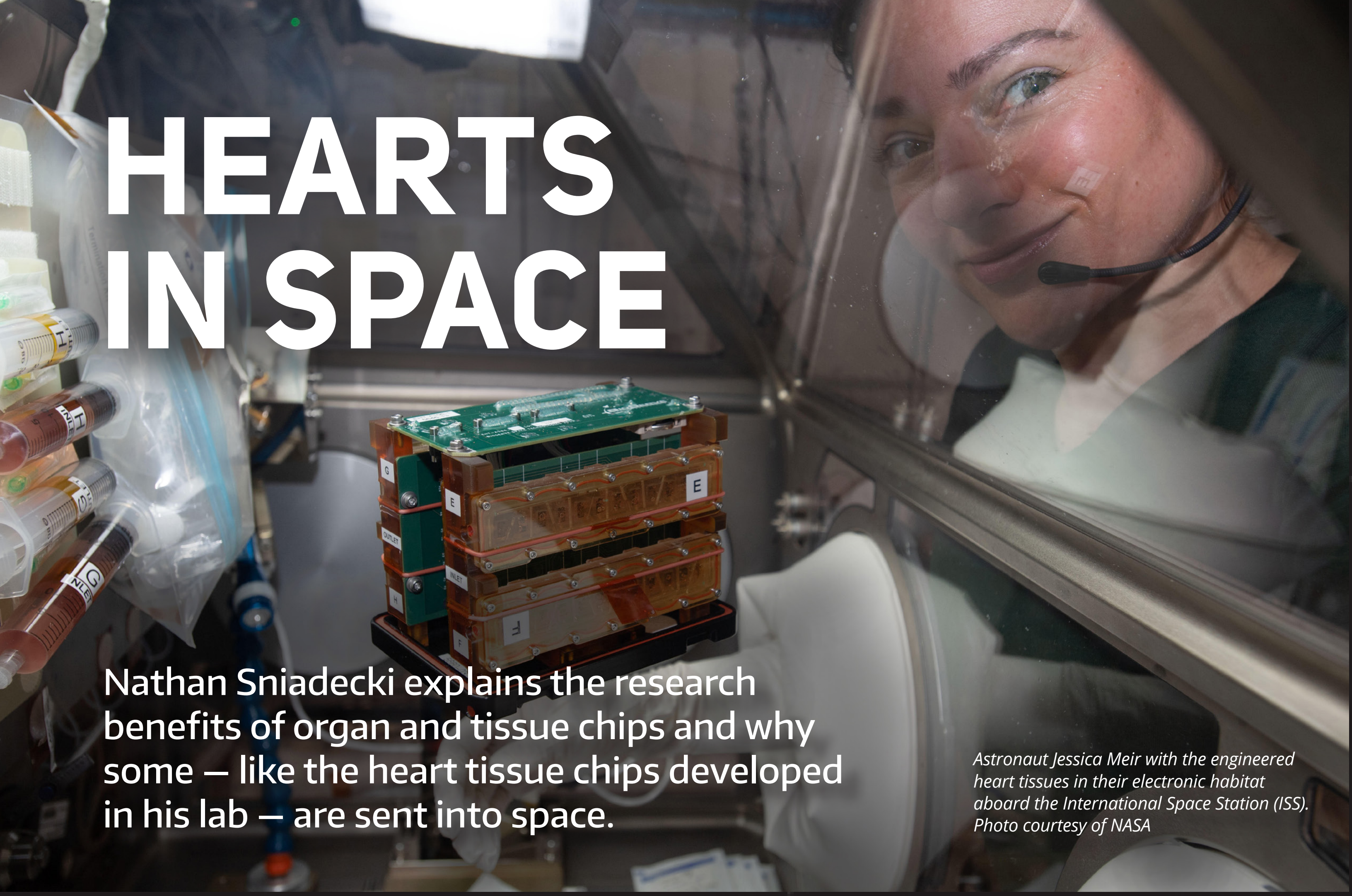
They quickly set out to produce short videos of machine shop demos. Since the students would be missing out on the real-life experience, they decided to make the videos not just instructional but also fun, adding music and graphics to keep students engaged. Covering topics like countersinks, welding and boring, their videos are anything but boring.

"Everything is a design problem," says McQuaide. "This situation forced us to think about the underlying concepts and make supplemental content we can use in the future."



ME's Reggie Rocamora records a welding demo on his phone. Photo by Mark Stone / University of Washington

HEARTS IN SPACE



Nathan Sniadecki explains the research benefits of organ and tissue chips and why some — like the heart tissue chips developed in his lab — are sent into space.

Astronaut Jessica Meir with the engineered heart tissues in their electronic habitat aboard the International Space Station (ISS). Photo courtesy of NASA

During extended space travel, astronauts can experience accelerated bone loss, changes in gene expression, and compromised immune systems and organ function. So if space programs want to make longer and further travel possible — to Mars, for example — they will need to know how to keep crews healthy.

Organ and tissue chips give researchers a unique opportunity to study the impact that space travel has on the human body. In 2016, the National Institutes of Health (NIH) partnered with NASA and the International Space Station (ISS) to launch the Tissue Chips in Space program. This spring, heart tissue from the UW joined an elite group of space travelers — chips modeling kidneys, lungs, bone and cartilage — for experiments aboard the ISS.

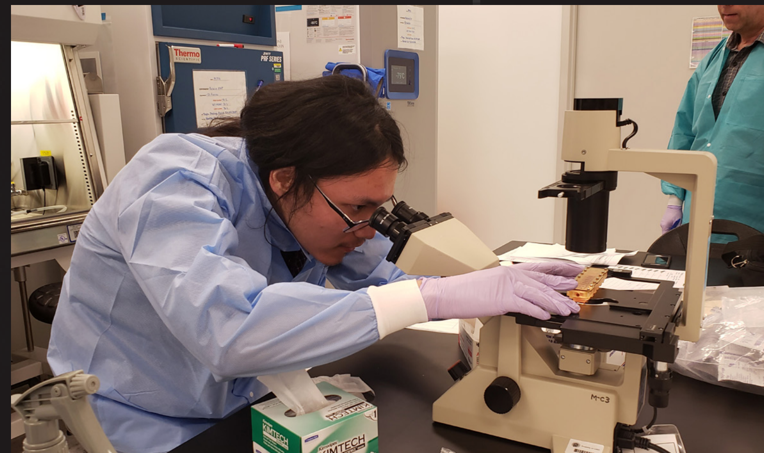
ME professor Nathan Sniadecki (left) leads the research team behind these heart tissue chips. Over five years ago, his lab invented magnetic technology to measure the beating of these heart tissue chips. He began working with bioengineering (BioE) faculty member Deok-Ho Kim at the UW Medicine Institute for Stem Cell & Regenerative Medicine (ISCRM) to use this technology for the ISS project. Kim has since left UW and joined the Johns Hopkins University faculty, but the work still continues in Sniadecki's lab with the help of ME doctoral student Ty Higashi and BioE postdoc Jonathan Tsui.

To determine how microgravity affects human heart muscle, the team sent their 3D beating heart tissue to the ISS via a SpaceX Dragon cargo spacecraft on March 9. The experiment ran on board the space station for a month before its successful return to Earth.

The College of Engineering's Chelsea Yates spoke with Sniadecki — who currently serves as interim director of UW Medicine's Heart Regeneration program — about organ and tissue chip research in space and where this work is headed next.

What are organ and tissue chips?

Organ and tissue chips are small devices lined with living human cells. Basically they are tiny 3D cross-sections of organs and tissues. They give us a way to recreate organ-like environments to better study how organs and tissues work and how they respond to disease and treatment. In this way, they are like miniature testbeds.



As tiny models, they allow researchers to study human organ function outside of the body and at the cellular scale. We can create chips with diseases to study how organs react and also use them to test and refine drug treatments. This research promises advancements in personalized medicine: Researchers could create organ and tissue chip models unique to an individual to determine the best course of treatment for his or her specific condition.

Why send heart tissue chips to space?

We know that astronauts are at risk for changes in their cardiac function and rhythm. Plus, microgravity is known to speed up aging and likely influence other cell or tissue properties. Because aging is accelerated in space, studies on the ISS allow us to assess this process over weeks instead of years. So, to learn how microgravity and other physical forces in space affect heart muscle in particular, my team packed our heart tissue chips for space.

There are Earth benefits, too. This work allows us to gather information to help prevent and treat heart muscle damage in people generally, as well as understand how aging changes heart muscle. Over the years, several space technologies — mini-cameras like those in smartphones, scratch-resistant lenses, wireless headsets and more — have found their way to life on Earth. It will be great to add tissue research like this to that list.

Tell us more about your involvement in the Tissues in Space project.

Our tissue traveled to the ISS in small, compact devices, each about the size of a smartphone. Each holder contained a row of tiny, 3D strings of beating heart tissue grown from human cells. In space and on Earth, our heart muscle tissue is supported between two flexible posts that allow it to contract freely, in contrast to the rigid confinement of a Petri dish. The posts contain tiny magnets so when the tissue contracts, the position of the magnets changes, which we can detect with a sensor. This part — embedding magnets into the post design and using magnetic detection — has been a key contribution that our team has made to heart tissue chip development.

Each of the tissue strands contains about half a million cells that act like heart tissue in the body. So it's possible to watch these "heart strings" shorten and expand in the dish, just like little heart beats. In space that motion was detected by a sensor, and the data was sent back to our lab so we could monitor it. We also had a simultaneous twin study underway in our lab so we could compare the space tissue to tissue here on Earth.

What happens next?

There's a lot of data, which we'll review over the next few months so we can get a clearer picture of what's happening to heart muscle cells and tissues in astronauts during a space mission. We plan to send our tissue to space again in the future, next time to investigate if medications and medical interventions can offset what the heart endures during extended space missions.

Discover more

Visit Sniadecki's Cell Biomechanics Lab to learn more about how mechanics affect the human body and disease at the cellular level:

faculty.uw.edu/nsniadec

Above: ME graduate student Ty Higashi inspects a tissue chamber at NASA in preparation for spaceflight. Photo courtesy of Devin Mair

Left: For spaceflight, the team developed an enclosed chamber to house the tissues in microgravity. Each chamber holds six tissues. Photo courtesy of Nathan Sniadecki

WASTE TO WATER

By Andy Freeberg

The 2020 Alaska Airlines Environmental Innovation Challenge (EIC), hosted by the UW Foster School's Buerk Center for Entrepreneurship, named Aquagga, co-founded by members of UW ME and the University of Alaska Fairbanks (UAF), as $15,000 grand prize winners, extending ME's streak to two years in a row.

In a competition that was held completely virtually and included a strong showing from ME with four teams named as finalists, Aquagga's patented technology for destroying toxic and hard-to-treat PFAS chemicals wowed judges and earned them both the grand prize and the $1,000 UW Grand Challenges Impact Lab domestic prize.

"Forever chemicals"

Per- and polyfluoroalkyl substances (PFAS) are hard to break down. That sturdiness makes them excellent for any kind of product that resists sticking, staining, grease or corrosion, but once they leave those products and leach out into groundwater, the same property makes them a stubborn and pervasive toxin. PFAS are so ubiquitous that they've been found everywhere from newborn babies to polar bears.

The most concentrated application of PFAS is in firefighting foams that put out oil, jet fuel and other hard-to-extinguish fires. In locations like firefighting training centers, airports and military bases, where specialists learn to use these foams, trainers were initially instructed to simply hose off the foam like soap. The result are hot spots, such as an airport in Gustavus, Alaska, where plumes of PFAS-contaminated soil created harmful levels of toxins in the drinking water supply.

Aquagga's roots

But Aquagga didn't initially set out to confront the havoc of PFAS. The origins of the company began with hardware invented by Jon Kamler during his doctoral work at UAF. Part pressure-cooker, part pressure-washer, but turned up to 11, his device takes advantage of the ability to 3D print durable metal alloys to overcome many of the challenges of using supercritical water to treat toxic waste.

Kamler patented his designs and connected with entrepreneur Nigel Sharp, who helped get an Alaska Seed Fund grant to kickstart their project.

The third major piece came together when the pair approached Brian Pinkard, a doctoral student in ME's Novosselov Research Group who happened to be living in Anchorage that summer. Pinkard joined the team with the help of an NSF I-Corps grant, which supports researchers who are exploring ways to apply their advances to industries. At the time Aquagga had many ideas for their technology, but meetings with industry sharpened their focus.

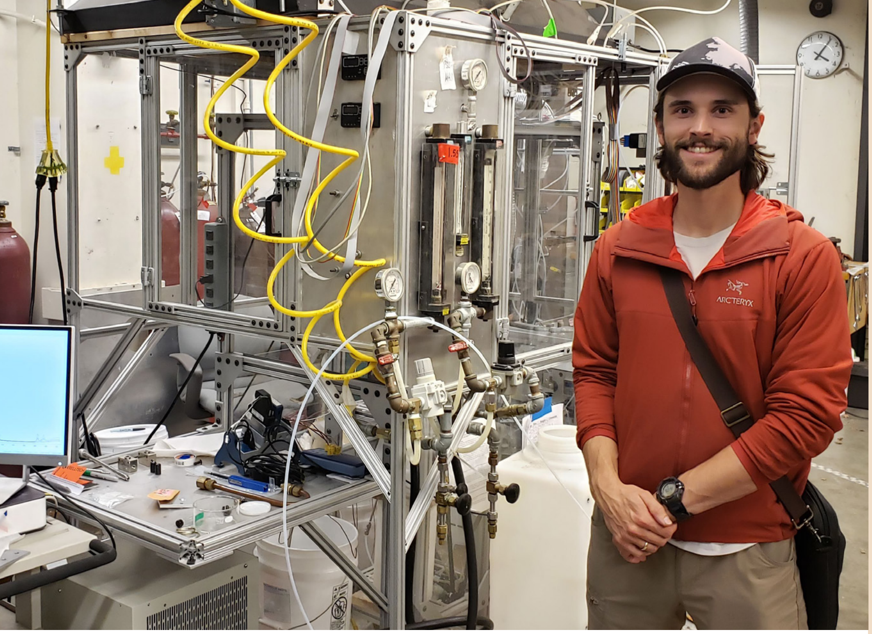
"In the lab you think, wow, this technology can do this really amazing thing," says Pinkard. "But then you go actually talk to people and they say, 'yeah, that's great but we don't really have that problem.'"

However, during the course of 180 customer discovery interviews, their discussions with organizations doing PFAS cleanup uniquely stood out.

Finding a product-market fit

Efforts and regulations aimed at PFAS cleanup have escalated greatly over the past decade, resulting in multi-million-dollar remediation projects. Environmental firms pump ground water or wash soil by literally excavating the earth and running it through massive filtration systems.

"Picture an industrial-sized Brita filter," describes Pinkard. "What happens is the PFAS concentrates in the filter and ultimately the problem is the concentrated PFAS. That's what they don't have a good disposal system for."



Projects are left with barrels of toxic, indestructible PFAS waste. But it is those barrels where Aquagga finally found their product-market fit. Because the Aquagga system is so scalable, the team envisions it being deployed site-to-site for short periods of time, rather than built and installed on a permanent basis.

Competing in the EIC

With their experience in I-Corps and the addition of Chris Woodruff (MSME ’19), Aquagga says the EIC was a natural fit. Even with the curveball of an all-virtual format in response to the COVID-19 crisis, the team felt confident.

“It was actually energizing and fun,” says Sharp of the Zoom-based virtual competition. “It reminded me what a really good trade show booth can feel like, where you have people coming by to talk to you and you’re trying to funnel everyone through.”

With the benefit of the EIC prizes, Aquagga is now seeking supporters to help them get a pilot system deployed next year.

Pinkard notes that the company name Aquagga is a portmanteau of aqua, a reference to the clean water they create, and a quagga, an extinct subspecies of zebra. “The zebra company is like the antithesis to the unicorn company,” explains Pinkard. “Positive environmental and social impact is one of our main drivers, not just profit.”

Above: Aquagga co-founder Brian Pinkard. Photo courtesy of Aquagga

Left: Aquagga envisions a system small enough to be easily transported for temporary use at multiple locations. Image courtesy of Aquagga

Learn more about Aquagga at Aquagga.com

Three other ME-affiliated teams made strong showings as finalists in the Environmental Innovation Challenge.

BioArchos: Removing indoor CO2

Like a robot houseplant on steroids, BioArchos proposes a wall-mounted air filtration system that will remove as much carbon dioxide from the air as five large oak trees. Because carbon dioxide levels have been tied to cognitive ability, BioArchos identifies a market for a device that will boost office productivity, while saving cost over major HVAC systems and contributing to climate change mitigation in the process.

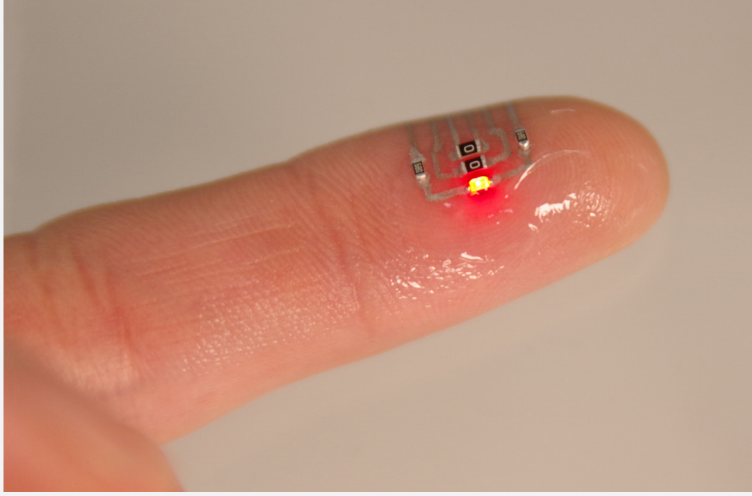
SENSOL Systems: Solar-powered, LED-lit crosswalks

SENSOL Systems has designed a crosswalk using modules of recycled, 3D-printed plastic with embedded solar panels and LEDs that lights up as pedestrians walk across it. The illumination is more than a novelty, the National Highway Traffic Safety Administration reports that on average there are more than 16 pedestrian deaths each day in the U.S. and 75% of those occur at night.

Supercritical Performance: A cutting-edge system to boost supercritical phase mixing

Supercritical Performance’s fully functional prototype system enables rapid, efficient mixing of fluids in their unique supercritical phase for a range of applications from cleaning hazardous substances to promoting material synthesis. By reducing the energy required, improving the purity of the resulting materials, and destroying more waste, the team says better mixing is key to a cleaner future.

Mechanical engineering on the **nanoscale**



ME faculty are developing new materials, environmental monitoring systems and health care devices.

The emerging discipline of nano-engineering is uncovering possibilities for advancements in manufacturing, robotics, health care, energy and other industries by revolutionizing materials, structures and systems at the smallest scale.

But how small is small? Nano-engineering is the manipulation of materials and processes at the nanoscale — about one to 100 nanometers. (For reference, a human hair is about 80,000 to 100,000 nanometers wide.) At the UW, much of this research takes place through the Institute for Nano-Engineered Systems (NanoES).

Applying individual nano-elements to large-scale systems is one of the field's biggest challenges. Doing so often requires a multidisciplinary approach to systems engineering and problem-solving — a skillset with which mechanical engineers are well-equipped. Currently four ME faculty are part of the NanoES community of researchers. Their projects are highlighted here.

Assessing health impacts of nanoparticles

Exposure to nanoparticles present in air pollution — from traffic emissions, forest fires and manufacturing processes — can result in health problems including cardiopulmonary diseases and cancer. The toxic potential of these particles depends on their size, structure and chemical composition. To evaluate the chemical composition of combustion nanoparticles and the health impact of their nanostructures, the Novosselov Research Group led by ME associate professor **Igor Novosselov** is developing new techniques.

For example, molecular engineering doctoral student Justin Davis has developed an analysis technique tracking the evolution of particle nanostructures during their formation, finding that young, amorphous particles show more of an increased toxicological response than structured, mature particles. And ME doctoral students Gaurav Mahamuni and Jay Rutherford have developed a novel method using excitation-emission matrix (EEM) fluorescent spectroscopy to analyze organic compounds associated with combustion generated particles. In combination with machine learning, the EEM analysis can be used to evaluate nanoparticle toxicity and in the development of wearable sensors to monitor and assess exposure to harmful particles.

Developing integrated functional materials

For nanomaterials to be used efficiently, they must be reliable, consistent and stable under all conditions. They also need to be manufactured in a scalable and cost-effective way. To develop new functional materials that match the adaptability, multi-functionality and intelligence of natural materials, ME assistant professor **Mohammad Malakooti** is leading a research program that bridges the gap between nanoscale engineering and macroscale electronics and intelligent systems.

Nano-engineered materials can be designed to provide enhanced properties, including biochemical sensitivity, strength, selective transport, thermal or electrical conductivity and optical properties, to name a few.

Researchers in the Malakooti Research Lab are studying scalable materials synthesis and integration, controlled stability of materials at the nanoscale, and versatile manufacturing of functional nanomaterials that are durable and long-lasting under real-world conditions. Their work within these areas will impact emerging applications, such as self-powered wearable electronics, printed electronic skin, multifunctional composites, integrated nanoscale devices and stretchable biosensors.

Top: Wearable electronics are one example of a real-world application that benefits from nanomaterial innovation. Whether they are directly attached on skin as seen here or integrated in clothes, these electronics collect data to monitor human health and activity. Image courtesy of Mohammad Malakooti

Introducing insect-sized robots

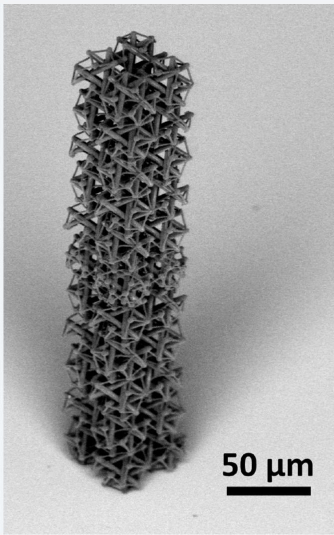
Insect-sized flying robots, such as those in development in the Autonomous Insect Robotics Laboratory (AIR Lab) can help with time-consuming tasks like surveying crop growth or detecting gas leaks. These robots soar by fluttering tiny wings because they are too small to use propellers, like those on larger drones. In addition to being able to easily maneuver tight places that are inaccessible to bigger robots, these robots also cost less to build.

However, creating insect-sized robots involves challenges at most all levels of development — from operating the robots' tiny wings to overcoming limits in the amount of computation needed to power them. ME assistant professor **Sawyer Fuller**, who leads the AIR Lab, is looking to the sensory-motor control systems of biological insects to solve these challenges. Insects perform tasks that remain at the forefront of robotic capabilities, such as landing on flowers buffeted by turbulent wind or performing maneuvers to dodge flyswatters.

Fuller's team is developing robots the size of bumblebees or smaller with similar capabilities. They implemented the first integrated high-voltage electronics circuitry to power the robots' flight, enabled rapid flight maneuvers using a tail-like appendage, and developed a design for better control. The team's advancements extend beyond insect robots to any area in which there's a need for miniaturized, power-efficient sensing and control systems or more dynamic, life-like robots.

Using nanoarchitecture to create better materials

Nanomaterials have exceptional properties — strength, toughness, damage tolerance and enhanced ductility to name a few — often not found in traditional engineering materials. ME assistant professor **Lucas Meza**, who leads the Meza Research Group, is working to create novel nano-engineered materials by investigating the interplay between mechanics and architecture at the nanoscale.



Meza's team combines nanoscale additive manufacturing with advanced materials processing techniques to create new materials from the nanoscale up. They also use in-situ nanomechanical testing to break down materials and study their properties at the nanometer level.

One of the group's current projects is to create nanoscale tensegrity materials. Tensegrities are structures that obtain their integrity through tension networks. They are common in nature — in cell cytoskeletons, spider silk, musculoskeletal systems and other areas where strength and versatility are required. Meza's group uses nanoscale additive manufacturing to develop nanostructured rod and cable networks that are then thermally decomposed to create strong, carbon tensegrity-based artificial materials known as "metamaterials." These metamaterials may one day be used as high-strength, shape-changing nanostructures and as scaffolding in artificial tissues.

Above: A two-photon lithography tetrakaidecahedron tensegrity tower, made in the Washington Nanofabrication Facility and imaged in the UW Molecular Analysis Facility by Caelan Wisont.

Left: Creating insect-sized robots involves challenges at most all levels of development, from operating the robots' tiny wings to overcoming limits in the amount of computation needed to power them. Photo by Mark Stone / University of Washington

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2020 GRADUATION

Thank you to UW alumna Beverly Wyse (BSME '85, MBA '05) for delivering the 2020 ME virtual graduation address. For over three decades leading several of Boeing's largest and most pioneering programs, Wyse combined technical capability with real world opportunities and innovations.

Whether their goal is to make a difference inside an iconic company like Boeing or change the world through a startup tackling global challenges, Wyse encouraged the ME Class of '20 to recognize that with tenacity, innovation and personal integrity they have the opportunity to build a better future for themselves and a better world for all of us.

Carried out this year through a live virtual format, ME awarded nearly 180 bachelor's, 140 master's and 25 doctoral degrees. Though not a replacement for an in-person event, the department was pleased that many of the graduates and their loved ones were able to watch the graduation safely from their homes. Those who are able are invited to walk in the 2021 campus ceremony as well.

Thank you, speakers

Leadership Seminar Series:

Megan Karalus (BSME '07, MSME '09, PhD ME '13), Siemens

Ben Hempstead (BSME '94), Electroimpact

Michelle Carey (BSME '01), Boeing

Pat Doneen (BSME '84, MBA '90), Impendi Analytics

Mike Machinski (BSME '91), Corbin Consulting Engineers

Rob Scheibe (PhD ME '96), GT Engineering

Beverly Wyse (BSME '85, MBA '05), Boeing

Capt. Heidemarie Stefanyshyn-Piper, NASA & U.S. Navy

Scott Brow (BSME '00), ON Semiconductor

Chair's Distinguished Industry Lecture Series:
Mary Baker, Hewlett-Packard

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