
College of
ENGINEERING
UNIVERSITY OF HAWAI'I AT MĀNOA
2020 YEAR-END REVIEW

MESSAGE FROM THE DEAN



Aloha kākou,

2020 was certainly a year we will never forget. Where do we begin? As engineers, this past year challenged us to do what we do best: to pivot, innovate and design solutions to the most complex and pressing problems facing our community. I am so proud of our students, faculty, staff, and alumni for pushing forward this year to build upon the great legacy of the College and reach achievements - both academic and otherwise - great and small. Here's to a bright and healthy 2021.

Mahalo,

Brennon Morioka, PhD, PE
Dean, College of Engineering

$17M in research awards
with $10M in expenditures

8% growth
in new fall undergraduate enrollment

52% Transfers
amongst new fall students, largely from Hawai'i community colleges

16 VIPs and 9 clubs
Vertically Integrated Projects and professional organizations

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BANQUET VIRTUAL FUNDRAISER WAS A SUCCESS

Like nearly all events since the arrival of COVID-19, the college's 20th Annual Banquet that was to take place on April 22 never happened. The event – the college's largest event of the year that typically draws over 800 people – is traditionally the primary fundraiser for undergraduate student research projects, so its cancellation left students and staff alike nervous about limited funding and opportunities in the year to come.

Additionally, with massive cuts to the university's general fund and tuition revenues projected, student projects are expected to rely more on financial support from sources outside of the university, like the industry partners that typically contribute to the banquet.

But social distancing did not stop the college from taking its fundraising efforts online with a "virtual fundraiser." The team set a goal of $100,000 from those industry partners by April 22nd, which would have been the date of the banquet, with all contributions being 100% tax deductible.

Thanks to the college's dedicated community of supporters, fundraising efforts exceeded this goal by bringing in $119,850, generated through over 50 unique gifts coming from both organizations and individuals in amounts ranging from $50 to $5,000.

"We truly appreciate every effort, big and small, to support the College in these uncertain times," said Dean Brennon Morioka. "These monies will allow us to fund next year's round of student projects and activities to continue fostering learning, innovation, and professional development within our student population."



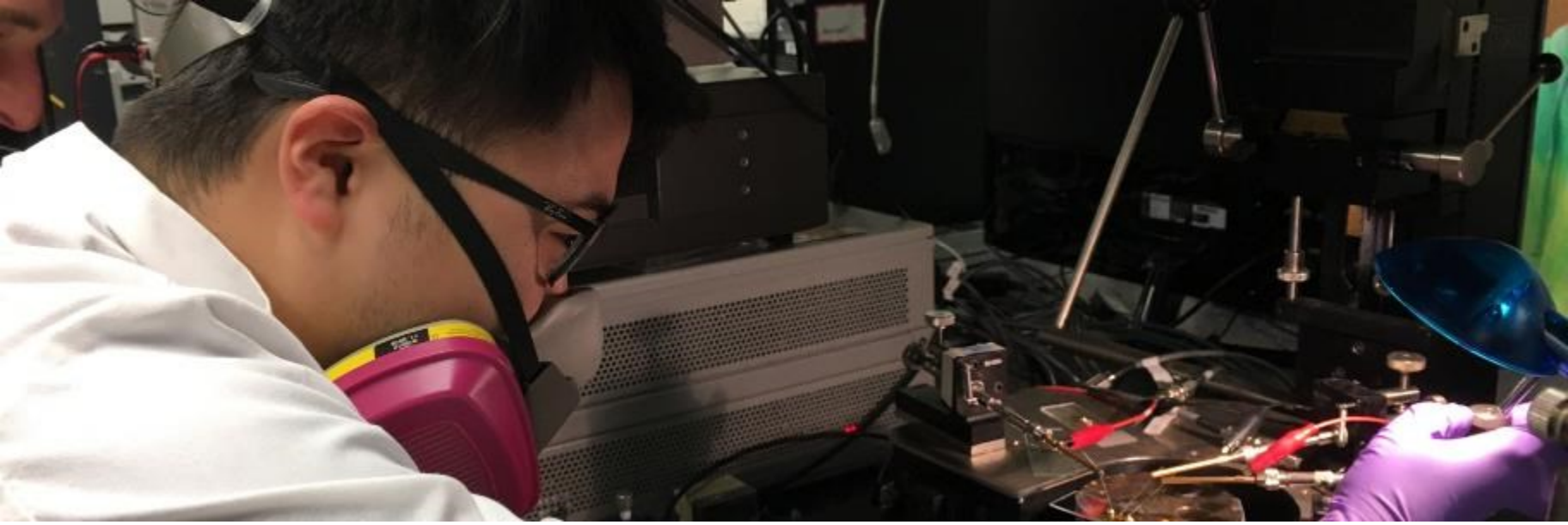
BREAKTHROUGH TECHNIQUE COULD EXPAND VENTILATOR CAPACITY

An innovative technique to treat up to four COVID-19 patients with a single ventilator has the potential to save lives in Hawai‘i and around the world.

The team working on the new method includes: University of Hawai‘i at Mānoa Mechanical Engineering Associate Professors A Zachary Trimble and Scott Miller, Brennan Yamamoto, a 2019 UH Mānoa mechanical engineering PhD graduate and researcher for the University of Hawai‘i Applied Research Laboratory, Russell Woo, MD, Kapi‘olani Medical Center for Women and Children pediatric surgeon and John A. Burns School of Medicine (JABSOM) associate professor of surgery, and the project’s founder, Donald Gaucher, MD, an anesthesiologist at Straub Medical Center.

“The quad-split ventilator system allows four patients to be ventilated off one ventilator, each with their own different minute ventilation,” Gaucher said. Researchers said doctors worldwide are already working on ways to treat more than one patient with a single ventilator. However, this advancement allows patients to receive more individualized care than simply just sharing the ventilator.

“This system works by using a series of flow and one-way valves, as well as some 3D-printed materials to individually regulate the flow and thereby the volume and pressures to each of the patients sharing the ventilator,” Woo said. “It allows for individualizing multiple elements of the respiratory care, which we feel will make this more safe and more feasible.”



UH MĀNOA STUDENT, ALUM EARN $135K NSF RESEARCH FELLOWSHIPS

In April, a current University of Hawai‘i at Mānoa College of Engineering senior and a recent graduate have each been awarded a $135,000 National Science Foundation (NSF) Graduate Research Fellowship. They are two out of only 59 electrical engineering students selected nationwide.

Nicholas Yama is in his final semester at UH Mānoa and is scheduled to be a PhD student at the University of Washington in fall 2020. Yama said the funding will cover his educational and living expenses. “Beyond the financial security it provides, it also alleviates the stress on my PhD advisor to find funding for me from their own grants,” Yama said. “This means that I’ll be able to be more flexible with what projects I work on what research interests I can pursue.”

Kevin Kam graduated from UH Mānoa in 2017 and is currently a PhD student at Columbia University. Kam said the award will help fund his PhD research on designing rechargeable implantable bio-potential monitoring devices for wild rats. “New York City is home to a ton of wild rats. In collaboration with the Columbia University Medical Center, the goal of this project is to implant wild rat colonies with these devices to study the stress-induced pathophysiology of wild rats versus laboratory rats,” Kam said. As an undergraduate student, Kam said he worked on a project involving ferromagnetic materials to create configurable radio frequency circuits using liquid metal.



UH MĀNOA COVID-19 WASTEWATER SURVEILLANCE PROJECT RECEIVED NSF FUNDING

A University of Hawai‘i at Mānoa COVID-19 research project that aims to discover the community disease burden of COVID-19 through wastewater testing and surveillance received National Science Foundation (NSF) funding. Civil and Environmental Engineering Professor Tao Yan received an NSF grant for more than $150,000 for his proposal “RAPID: Determine Community Disease Burden of COVID-19 by Probing Wastewater Microbiome.”

Yan’s research will involve collecting time-sensitive wastewater samples from communities impacted by the disease, with assistance from UH facilities and local wastewater utilities, and developing a highly efficient concentration and detection method that is specifically optimized for the enveloped virus in wastewater. Currently, the team is collecting samples in Mānoa and is working to determine other additional locations.

The research is expected to fill a major technological gap and significantly advance researchers’ capability in working with the SARS-CoV-2 virus in wastewater and other water environments. Additionally, it could generate much-needed information to improve the understanding of community transmission of the disease.



ENGINEERING STUDENTS DEVELOPED REAL-WORLD SOLUTIONS THROUGH INDUSTRY-INTEGRATED COURSES

Students at UH Mānoa's College of Engineering don't just study theory and concepts – they roll up their sleeves and attack current challenges within our community. More and more, the college is pivoting to infuse industry-integrated courses into their four-year curricula, where, through the course of a semester, students are paired with local organizations to design and develop solutions to address actual problems.

One such opportunity, the Community Innovation Mentorship Program (CIMP), was born through a collaboration between local company DataHouse, Transform Hawai'i Government, Hawai'i Technology Development Corp (HTDC), the State of Hawai'i Department of Agriculture, and the College of Engineering.

The program, under the umbrella of the TRUE Initiative, afforded a team of seven undergraduate computer engineering students the opportunity to tackle software development projects side by side with industry experts. The team started by utilizing tools and techniques to identify and refine problems, to which they then brainstormed and prioritized innovative solutions involving programming frameworks and methodologies, user authentication, technical architectural and database design, middle-tier business logic, and front end UI/UX frameworks.



ALOHANET HONORED AS ENGINEERING MILESTONE

The University of Hawai‘i at Mānoa College of Engineering was the birthplace of a revolutionary wireless communication technology nearly 50 years ago, and the project that started it, ALOHAnet, has received a major international engineering honor.

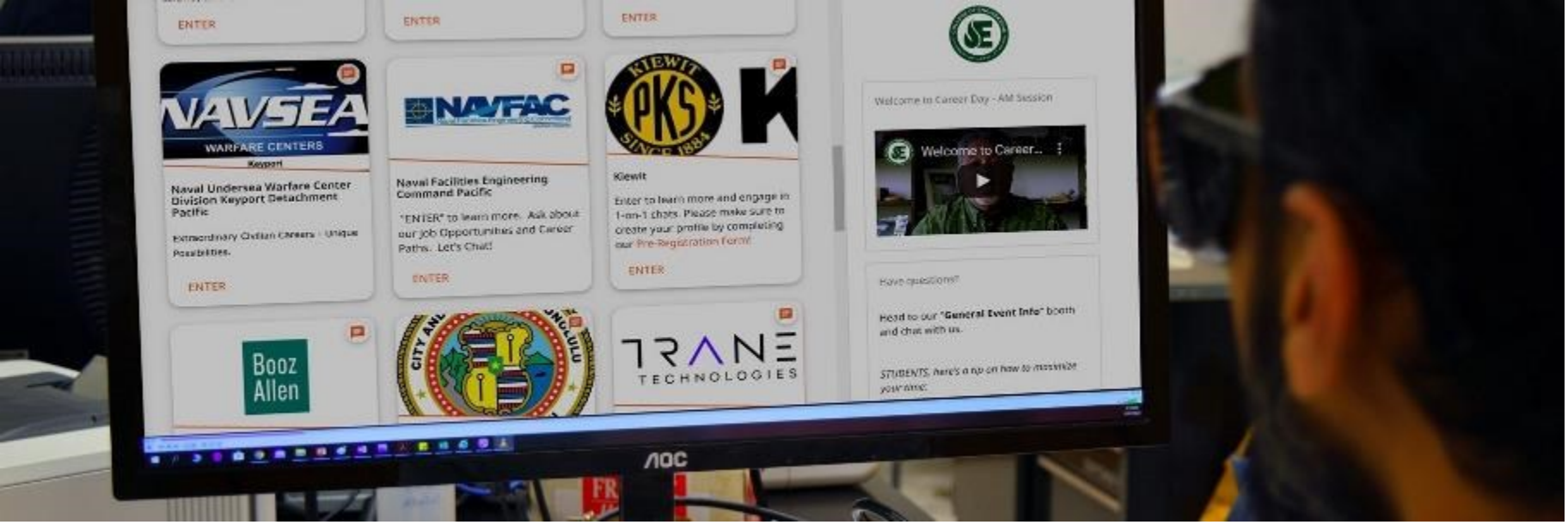
On October 13, ALOHAnet was recognized by the Institute of Electrical and Electronics Engineers (IEEE) as an IEEE milestone—after a lengthy application and selection process—in a dedication ceremony at UH Mānoa’s Holmes Hall.

“ALOHAnet and the ALOHA protocols all developed right here have changed the world as one of the critical enabling technologies for the Internet before it was called the Internet,” UH President David Lassner said.

“It’s been unbelievable for me to be able to say that I have the opportunity to work at a place that can arguably be said to have given birth to our modern way of life, a lifestyle that is inextricably intertwined with the Internet, cell phones, WiFi and all other mobile technologies out there,” College of Engineering Dean Brennon Morioka said.

Governor David Ige, a UH Mānoa electrical engineering alumnus, said ALOHAnet is an example of how UH has shaped the future of Hawai‘i.

“Clearly what ALOHAnet means to the internet and wireless communications is just another inspiration for all of us as we look forward to what the future will be,” Ige said.



COLLEGE'S FIRST VIRTUAL CAREER DAY WAS WELL RECEIVED BY RECRUITERS AND STUDENTS

The college held its first virtual Career Day on September 23rd, and by all accounts, it was a smashing success. This semi-annual career fair for engineering-related recruiters and students attracted over 450 students and 300 recruiters from 81 organizations. Over the course of the day, 2,000+ one-on-one chats were completed via text, audio, and video chats over the Brazen online platform.

Overwhelmingly positive feedback has prompted the college to already begin planning for another virtual fair in Spring (Feb. 24, 2021), with hopes to supplement it with a face-to-face element if conditions allow. "We're thrilled to have received great feedback from both booth representatives and candidates, and look forward to making our Spring Career Day even better," according to Kim Perez Hults, the fair's principal organizer and Director of Marketing & Outreach Relations for the college.

The college's industry partners were also pleased with the event. "We were well prepared as employers due to the time and support of UH staff, and are looking forward to providing rewarding opportunities for Honolulu's next generation of engineers," said City and County of Honolulu internship program coordinator Debby Nishimura.

Dean Brennon Morioka added, "This virtual Career Day event was an amazing way to connect our students with our industry partners during these ever changing times."



ENGINEERING INDUSTRY COLLABORATED TO GROW HAWAIʻI'S TALENT PIPELINE

A first-ever solutions-focused engineering industry strategy session drew 40 business leaders and educational partners to a virtual meeting in July, convened by the University of Hawaiʻi and the Chamber of Commerce Hawaiʻi. Driven by the Oʻahu Engineering Sector Partnership, the group's mission is to foster cross-sector dialogue and collaboration to better understand Hawaiʻi's current engineering talent pipeline and develop strategies to improve student preparedness for careers in engineering.

The group's steering committee is comprised of leaders from a wide range of organizations, including the UH Mānoa College of Engineering, Hawaiʻi P-20, Bowers + Kubota Consulting, Oceanit, Castle and Waipahu High Schools, Kamehameha Schools and many more.

During the 90-minute session, participants sought to understand the current landscape by examining data about the engineering pipeline including the diversity of engineering careers available, the workforce demand, the supply of Hawaiʻi engineering graduates, the schools and locations students come from, and feedback from educators and industry on areas for student growth.

Attendees agreed that there are many available, yet disconnected work-based learning activities to engage students in engineering and STEM, and that more collaboration is needed to reach some of the group's goals for the state. These goals include building a focused cradle-to-career pipeline with connected, intentional activities that reinforce technical and professional skills, and supporting and expanding public high school engineering academies.



PROJECT PREPS TRAFFIC FOR SELF-DRIVING CARS, MORE

In a first-in-the-nation project, the Hawai'i Deptartment of Transportation is sponsoring a pilot project with the University of Hawai‘i at Mānoa College of Engineering that is expected to greatly improve traffic flow through a critical Honolulu corridor, while giving students hands-on experience to prepare them for future careers.

This unprecedented initiative—through a partnership with the State of Hawai‘i Department of Transportation (HDOT), Federal Highway Administration (FHWA), Econolite and Goldwings Supply—will utilize “Vehicle-to-Everything” communication technology, which connects vehicles, pedestrians and bicyclists, to the infrastructure. Signal devices have been installed at more than 30 intersections along Nimitz Highway and Ala Moana Boulevard.

Data collected by researchers will detail the operational improvements based on adaptive signal technology and will assist in increasing green time to a target of 60% via TravelSafely, a free mobile application available on the App Store and on Google Play. The app will provide Signal Phase and Timing (SPaT) and relative location alerts to all users of the highway. Total funding for the deployment of this state-of-the-art system and research was $6 million, with 95 percent coming from HDOT.



PARTNERS IN INNOVATION: PEARL HARBOR NAVAL SHIPYARD & COLLEGE OF ENGINEERING

A partnership between the Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) and the University of Hawai‘i at Mānoa’s College of Engineering is yielding promising results for both organizations, creating unique opportunities for collaboration and innovation that have the potential for long-range impact. The relationship became official in July 2018 when both parties entered into an Education Partnership Agreement. Since then, they have made progress on multiple fronts.

Two industry-integrated courses have launched with great success. The first, ME 491-Pearl Harbor Internship, affords students the chance to gain real-world engineering experience by working alongside Pearl Harbor engineers. It allows budding engineers the unique opportunity to work on a critical project in a classified, secure environment – think no cell phones – mentored by a supervisor, many of whom are UH graduates. The second offering, ME 481/482 – Senior Design Project, is a year-long capstone course in its first year of existence that has students tackling non-classified projects put forth by PHNSY & IMF, identifying the problem focus in the first stage and building a prototype in the second.

Another exciting element of the partnership is the arrival of a cutting-edge, $250,000 Markforged Metal X 3D printer installed at the College of Engineering. The printer, purchased by the Naval Sea Systems Command (NAVSEA) for educational and research purposes, is part of a three- year joint-use agreement allowing students and faculty to fabricate custom small metal parts for use in research and senior design projects and affording Navy personnel the ability to manufacture replacement parts, especially those that have long lead times or are obsolete.





IN MEMORIAM

HORST BRANDES

Dr. Horst Brandes was a friend and mentor to many, and respected by all. He was an outstanding faculty member and colleague in the Department of Civil and Environmental Engineering (CEE) over the past 23 years, and was well liked and respected by students, staff, and faculty. Dr. Brandes will be remembered for his love for Hawai'i and his midday runs down to the Ala Wai.

CEE department chair Ian Robertson remembers Dr. Brandes' contributions to Hawai'i: "I remember our survey of damage just days after the Kiholo Bay earthquake on Hawai'i Island in 2006. Dr. Brandes' understanding of earth dam behavior was critical to that survey and to his subsequent expert witness work after the Kaloko Dam failure on Kaua'i. I personally connected with Horst as my go-to 'soils engineer.' He was an integral part of the CEE faculty at UH and will be sorely missed."

NORM ABRAMSON

Dr. Norman Abramson was University of Hawai'i at Mānoa professor emeritus of electrical engineering and one of the founders of the pioneering ALOHAnet system, the world's first wireless network.

"There are very few people who had as significant an impact as Norm on the way the entire planet communicates and shares information today. He inspired colleagues and students to set aside conventional thinking, to develop fundamental new concepts, and to prove their ideas by engineering working systems. Norm linked the islands of Hawai'i to each other and to the world, leaving a legacy at UH and beyond through his ideas and his students," said UH President David Lassner.


COLLEGE OF ENGINEERING
UNIVERSITY OF HAWAI'I AT MĀNOA
Hau'oli Makahiki Hou!
(Happy New Year)
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