UNIVERSITY OF OREGON

Phil and Penny Knight Campus for Accelerating Scientific Impact

FALL 2022

# ANNUAL REPORT

KNIGHT CAMPUS

# CONTENTS

Dear Friends and Colleagues,

It has been another year of tremendous growth and transformation at the Knight Campus. A year ago, we reflected on a building opening, a gift of epic proportions and major program announcements. In this moment, we look back on a year in which we successfully built on those monumental achievements – moving in and stretching out in our new home, making valuable new hires, training, and mentoring promising students, conducting meaningful research, collaborating across campus, launching innovative programs and fine-tuning existing ones – and came into our own as an academic institution.

The biggest academic news of the past year was the hiring of Danielle Benoit to the Knight Campus as the UO's first-ever Bioengineering Department Chair. I am so pleased to welcome Danielle, who brings with her the research and academic depth we need, along with a remarkable propensity for spotting and nurturing talent.

Recently I joined Danielle to welcome our 2023 bioengineering Ph.D. students to campus. It was great to hear so many inspiring personal stories from our newest cohort, and to see the Knight Campus through their fresh eyes. I was moved by the many reasons our students chose us as their academic home. One was motivated to become a scientist by a community science talk I gave more than three years ago in downtown Eugene, while another was drawn to the Knight Campus by the innovative and unconventional ways in which we train and support our students. Yet another student with a joint appointment in biomechanics and regenerative rehabilitation was able to carve out a path that would not have been possible without our partnership in the Wu Tsai Alliance. Their stories inspired me and underlined to me the many ways we are making significant connections to people and across disciplines. We also welcomed faculty members Courosh Mehanian, Gabriella Lindberg, and Felix Deku this year, bringing the total number of faculty to 13 and nearly filling our first building.

Knight Campus connections is a theme you will see me highlighting in the year ahead. Our academic and research programs are reaching wider audiences each year, and we have developed individual and campus-initiated collaborations throughout the University of Oregon – as well as with our scientific partners regionally, nationally and around the world.

One such connection is the Wu Tsai Human Performance Alliance. We are a proud, founding member of the Alliance and our group, the Alliance at Oregon, is headquartered in the Knight Campus. For three days during the World Athletics Championships 2022, we hosted the Alliance's Leadership Council. Not only was it a rich exchange of ideas, but it reminded me of the incredible impact we are having. The alliance is funding nearly a dozen research projects across the UO campus, including those involving researchers and innovators from the College of Arts and Sciences and the College of Design. Our work has the potential to help elite athletes perform better, as well as to improve human health and well-being for all of us.

Another example of collaboration is in workforce development. Later in this publication, you will read about the Oregon Pathways program. Funded by a new NSF grant, the initiative is a partnership that includes our Knight Campus Graduate Internship Program, the Department of Physics and the Department of Chemistry and Biochemistry. It builds on the materials sciences and optics strengths of UO undergraduate programs and is playing a vital role in Oregon workforce development. It led to a member of our team providing testimony before state legislators and inspired a substantial request for related state program support.
In all our academic programs, we are committed to providing world class training to the next generation of scientists and engineers for the benefit of their careers, companies recruiting top talent, and a society so much in need of brilliant young problem solvers.

You will also read about the Knight Campus Undergraduate Scholars program, which serves as another fine example of the bridges we are building across campus. This year, it supported 16 young researchers in pursuing their interest in bioengineering and bioscience research, matching early career researchers in our associated labs with talented undergraduates for a full year of mentoring, skill training and independent research opportunities. Laboratories in the Knight Campus and from five CAS departments and related research institutes participated this year with both the undergraduate and the mentor receiving financial support.
From the continued expansion and evolution of programs like the Knight Campus Undergraduate Scholars program to the hiring of Danielle Benoit as our academic leader to the successful recruitment of our latest cohort of 12 bioengineering students, we have covered a lot of ground in the last 12 months. If 2021 was the year we fired up the engines at the Knight Campus, then 2022 was the year our academic program really took off and the Knight Campus is now rocketing toward the future in 2023.

**Robert E. Guldberg, PhD**
Robert and Leona DeArmond Professor, Department of Bioengineering;
Executive Director, Phil and Penny Knight Campus for Accelerating Scientific Impact
Vice President, University of Oregon

# EXECUTIVE LEADERSHIP

## Robert E. Guldberg

Vice President and Robert and Leona DeArmond Executive Director
accelerate.uoregon.edu/robert-guldberg

Following a national search, Robert Guldberg was hired in 2018 to lead the Knight Campus as its inaugural Executive Director and serves on the President's Executive Leadership team as Vice President of the University of Oregon. Engaging internal and external stakeholders, he led the creation of the Knight Campus Strategic Plan and has forged new partnerships with Oregon's research universities, health care providers and institutions around the country. He's overseen recruitment of the Knight Campus faculty and launch of the University of Oregon's first engineering degree program. A serial entrepreneur and internationally renowned bioengineer, Guldberg's research program devises new medical devices and regenerative therapies for musculoskeletal tissues damaged by traumatic injury or degenerative diseases such as osteoporosis and osteoarthritis.

## Danielle Benoit

Lorry Lokey Chair of the Department of Bioengineering
accelerate.uoregon.edu/danielle-benoit

Danielle Benoit is an award-winning teacher and mentor whose research specializes in the rational design of polymeric materials for regenerative medicine and drug delivery applications. An active innovator, Benoit has ten patents/invention disclosures with related licensing agreements on many of them. As chair, Benoit will play an instrumental role in continued development of the Department of Bioengineering, including shaping and maturing the research and educational portfolio, coordinating fundraising, outreach, and alumni and industry relations and hiring of approximately 15 new faculty as Phase 2 of the Knight Campus is completed.

## Jim Hutchison

Senior Associate Vice President and Lokey- Harrington Chair in the Department of Chemistry and Biochemistry
accelerate.uoregon.edu/jim-hutchison

Jim Hutchison was a pioneer in green chemistry and green nanoscience. He has championed experiential graduate education in the UO's Graduate Internship Program. Hutchison founded the first center for green nanoscience, the Safer Nanomaterials and Nanomanufacturing Initiative of the Oregon Nanoscience and Microtechnologies Institute, a state signature research organization. He has co-authored several reports of the National Academy of Sciences on nanotechnology and green chemistry, published more than 130 scientific papers and won numerous national awards.

## Andrew Nelson

Associate Vice President of Entrepreneurship and Innovation and Randall C. Papé Chair in Entrepreneurship and Innovation
accelerate.uoregon.edu/andrew-nelson

Andrew Nelson received his PhD in Management Science and Engineering from Stanford University, where he subsequently served as a Lecturer. He also holds an MSc (with distinction) from Oxford University and a BA (with honors and distinction) from Stanford. His research explores the development and commercialization of technological innovations in fields ranging from biotechnology to digital music to green chemistry. An award-winning teacher, he also is the author of Technology Ventures: From Idea to Enterprise (McGraw-Hill), now in its 5th edition in multiple translations and used in entrepreneurship courses worldwide.

# EXECUTIVE LEADERSHIP

## Moira Kiltie

Associate Vice President and Chief of Staff
accelerate.uoregon.edu/moira-kiltie

Moira Kiltie has spent nine years at New York University in the offices of the chancellor and provost. As assistant provost, she had broad budgetary, personnel, and analytic responsibilities. In 2004, she joined the University of Oregon, serving most recently as associate vice president for research and innovation and divisional chief of staff with supervisory responsibilities over research development services, sponsored projects services, research communications, research advancement, research finance and business administration, and the Undergraduate Research Opportunities Program. She joined the Knight Campus in September 2016.

## Callie Johnston

Assistant Vice President for Development and Chief Development Officer
accelerate.uoregon.edu/callie-johnston
Knight Campus Giving: bit.ly/knight-campus-giving

Callie Johnston has a BA in English and Peace Studies from the University of Notre Dame and an MS in Public Service from DePaul University in Chicago. Prior to joining the Knight Campus, she spent 14 years in development at the University of Chicago, where she was most recently Senior Director of Principal Gifts in Medicine and Biological Sciences Development. In this role, she connected faculty who focused on cancer research, neuroscience, chemical biology, immunoengineering, community health/trauma, microbiome science, and basic science with individuals who were capable of making gifts of $5M or greater.

## Naomi Crow

Director of HR, Finance, and Administration
accelerate.uoregon.edu/naomi-crow

Naomi Crow joined the Knight Campus in September 2016 as one of the original team members and serves as the Associate Director of Operations. She has over 16 years of experience working in business operations, with 13 years at the University of Oregon. Naomi leads the Knight Campus Operations Team which handles all HR Services, Research Services, Academic Services and Financial Services for the Knight Campus. She holds a B.A. in English and a M.S. in Management and Leadership.

## Lewis Taylor, Director of Communications

accelerate.uoregon.edu/lewis-taylor

Lewis Taylor has a B.A. in English from Tufts University and an M.S. in journalism from Columbia University. He joined the Knight Campus in October 2021. He has experience in science communications training and practice, strategic communications, marketing, public relations, executive communications and higher education. He developed skills as a trainer at the Alan Alda Center for Communicating Science and has helped empower faculty experts to share their research and innovative ideas with mainstream audiences in memorable and engaging ways. He works closely with communications colleagues across campus to tell stories about new discoveries, breakthrough innovations, and impactful research and scholarship and is committed to leading efforts to illustrate the powerful mission and vision of the Knight Campus.

## DEPARTMENT OF BIOENGINEERING FACULTY

To get an idea of how Knight Campus researchers are focused on impact through biotechnology, here are links to their faculty bios:

**Danielle Benoit**
Lorry Lokey Chair of the Department of Bioengineering
accelerate.uoregon.edu/danielle-benoit

**Bala Ambati**
Research Professor
accelerate.uoregon.edu/bala-ambati

**Mark Blaine**
Associate Director for Science Communication Research, Journalism and Communication
Professor of Practice, Journalism and Communication
accelerate.uoregon.edu/mark-blaine

**Paul Dalton**
Associate Professor
accelerate.uoregon.edu/paul-dalton

**Felix Deku**
Assistant Professor
accelerate.uoregon.edu/felix-deku

**Tim Gardner**
Associate Professor and Robert and Leona DeArmond Chair in Neuroengineering
accelerate.uoregon.edu/tim-gardner

**Robert Guldberg**
Professor
accelerate.uoregon.edu/robert-guldberg

**Marian Hettiaratchi**
Assistant Professor
accelerate.uoregon.edu/marian-hettiaratchi

**Parisa Hosseinzadeh**
Assistant Professor
accelerate.uoregon.edu/parisa-hosseinzadeh

**Gabriella Lindberg**
Assistant Professor
accelerate.uoregon.edu/gabriella-lindberg

**Courosh Mehanian**
Research Associate Professor
accelerate.uoregon.edu/courosh-mehanian

**Keat Ghee Ong**
Professor
accelerate.uoregon.edu/keat-ghee-ong

**Calin Plesa**
Assistant Professor
accelerate.uoregon.edu/calin-plesa

**Nick Willett**
Associate Professor
accelerate.uoregon.edu/nick-willett


## WU TSAI HUMAN PERFORMANCE ALLIANCE

The World Athletics Championships 2022 wasn't just a great opportunity to see 2,000 elite athletes from around the globe competing against each other, but it also brought together leaders and collaborators from the Wu Tsai Human Performance Alliance for a three-day gathering hosted by the Knight Campus.

From Friday, July 22 to Sunday, July 24, Wu Tsai Human Performance Leadership Council members and collaborators participated in presentations, discussions, and tours of labs housing Wu Tsai Human Performance Alliance at Oregon research projects. Additionally, the group attended four sessions of competition at the World Athletics Championships.

Wu Tsai Human Performance Alliance

PHOTO: Bob Guldberg (left, foreground) and members of the group inside Hayward Field at the start of a qualifying heat for the Women's 100 Meter Hurdles





## DISTINGUISHED BIOMEDICAL ENGINEER TO LEAD KNIGHT CAMPUS ACADEMIC DEPARTMENT

In July, the Knight Campus named Danielle Benoit as the inaugural Lorry Lokey Chair of the Department of Bioengineering. An expert in therapeutic biomaterials for tissue regeneration and targeted delivery of therapeutics, Benoit is an award-winning teacher and mentor to next-generation researchers.

Having previously served as a distinguished professor in the University of Rochester's Department of Biomedical Engineering, Benoit is an NIH- and NSF-funded researcher who specializes in the rational design of polymeric materials for regenerative medicine and drug delivery applications. She completed her postdoctoral fellowship at the University of Washington in the Department of Bioengineering. She holds a Ph.D. and M.S. in Chemical Engineering from the University of Colorado, Boulder, and a B.S. from the University of Maine, Orono, in Biological Engineering. An active innovator, Benoit has ten patents/invention disclosures with related licensing agreements on many of them.

Benoit stood out as a candidate for the Knight Campus' first formal chair for the Department of Bioengineering for many reasons, including her commitment to her students, as well as the energy she pours into to her research and entrepreneurial activities, according to Robert Guldberg, Vice President and Robert and Leona DeArmond Executive Director of the Knight Campus.

"We look forward to her leadership in building out the department in the years to come and welcome her to the Knight Campus, where her lab program will intersect with numerous programs of our existing Knight Campus faculty," Guldberg said.

Until Benoit's arrival, the academic and research interests of the Knight Campus were ably led by James E. Hutchison, senior associate vice president and the Lorry Lokey Chair of Chemistry and Biochemistry. Hutchison will remain with the Knight Campus in his leadership role and will provide active succession support to Benoit.

KNIGHT CAMPUS


## KNIGHT CAMPUS-BASED IGEM TEAM SEEKING TO DEVELOP CONCUSSION BIOSENSOR

A team of UO undergraduates based in the Knight Campus has a new vision for concussion diagnosis: Rather than wait for the results of a CT scan, a quick sample of an athlete's blood, saliva or sweat could reveal a possible brain injury right from the sidelines of a football game. A simple test like that could help screen out athletes who shouldn't return to play after a knock on the head, by looking for the presence of proteins that are released by the brain in response to injury.

The group is UO's first foray into a student research competition called iGEM, short for International Genetically Engineered Machine. During a three-day event in Paris, they competed against teams of students from around the world, all of which developed some kind of new technology using synthetic biology.

The team uses lab space provided by bioengineering professor Calin Plesa. Anissa Benabbas – a graduate student in the Plesa Lab – provides instruction and mentorship to the team, which is co-mentored by Plesa and computational biochemist and Knight Campus professor Parisa Hosseinzadeh.



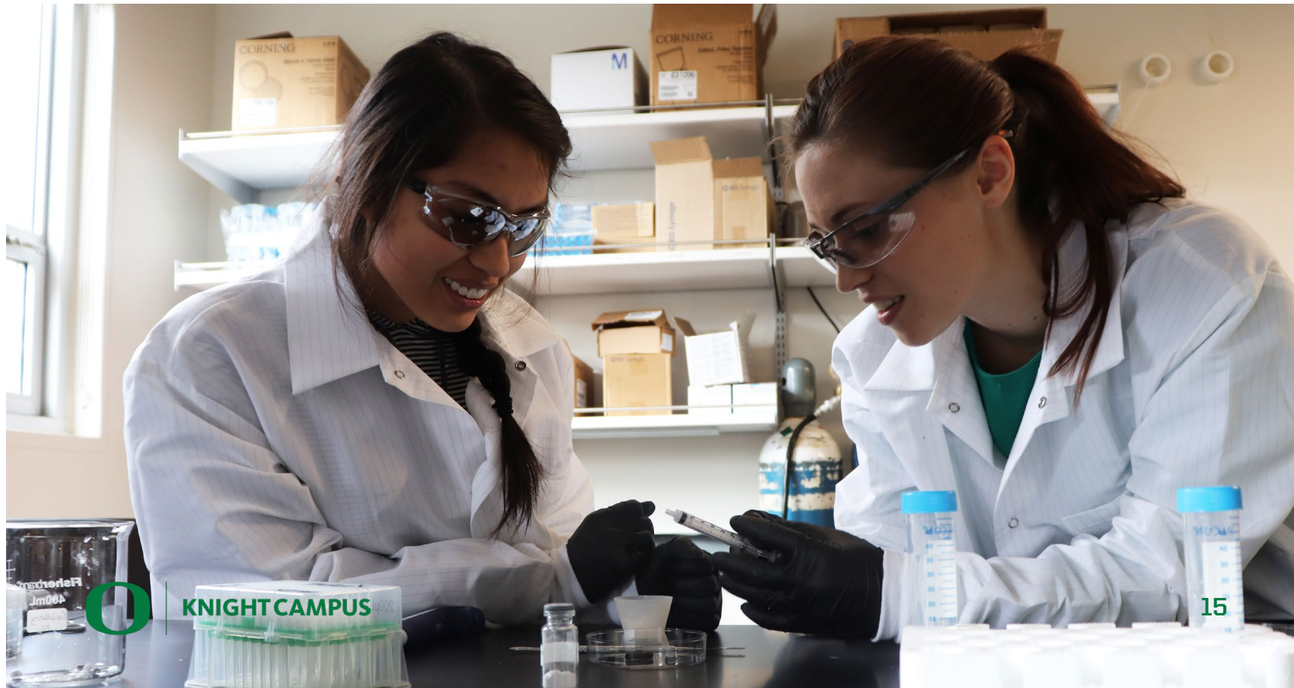


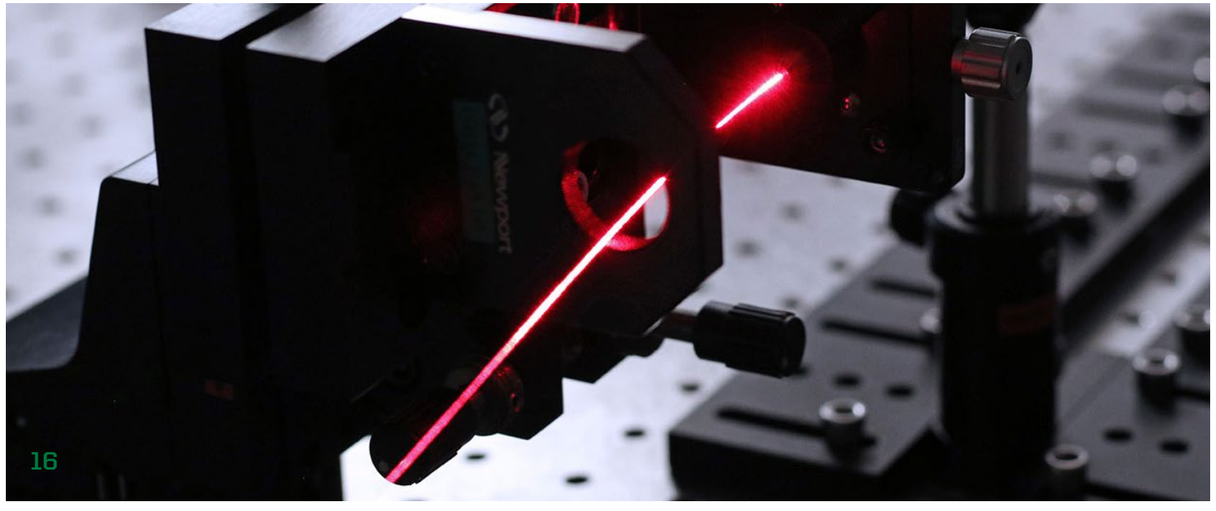
## KNIGHT CAMPUS UNDERGRADUATE SCHOLARS PROGRAM ACCELERATES THE CAREERS OF NEXT GENERATION LEADING RESEARCHERS

The Knight Campus announced its fourth cohort of Knight Campus Undergraduate Scholars in spring of 2022. The program pairs promising undergraduates with research mentors – graduate students, postdocs, and faculty members – immersing them in a 12-month, comprehensive research experience in Knight Campus-affiliated labs.

These next-generation leading scholars are taking on independent research projects in a diverse set of fields and connecting with mentors throughout the Knight Campus and across the UO. This year's cohort is the largest to-date and includes:

- Students from labs that are members of the Wu Tsai Human Performance Alliance
- Expanded philanthropic support. Every position is now funded by donors, industry, or intramural partner
- Support for women in STEM. Cohort is Female 68.8%; Male 25.0%; Non-binary 6.3%
- Support of Oregon residents: 68.8% are graduates of Oregon high schools





PHOTOS:
The 2022 cohort of Knight Campus Graduate Internship Program students throw their O as they begin the accelerated master's program which culminates with a nine-month paid internship



CONNECTIONS

# BUILDING A PIPELINE FOR STEM STUDENTS

## The Knight Campus Graduate Internship Program is a key player in a newly funded STEM pipeline program

When it comes to education and training for STEM careers after high school, not all students receive the support they need to succeed. A recently funded National Science Foundation grant hopes to remedy that for 64 low-income students in Oregon.

The $4.3 million grant is providing both financial support and mentorship support to help low-income community college students pursue careers through a program known as the Oregon Pathways to Industrial Research Careers. Students in their final year at a partner community college – Lane, Umpqua and Central Oregon – will receive cross-institutional training, mentorship and scholarships for four years as they make progress toward their bachelor's and master's degrees from the University of Oregon. It culminates with master's degree training through the Knight Campus Graduate Internship Program. The accelerated master's degree program includes a required nine-month paid internship, which provides graduates with strong work experience, paving the path for a long-term industrial career.

**"I cannot wait to empower students with the skills and connections that will launch their careers."**

**– Stacey York**
Materials Science Program Director
Knight Campus Graduate Internship Program

The program started in July and is recruiting its first scholars from community colleges this fall. It builds on previous collaborations with diverse student populations of community colleges and will help meet a pressing need for scientists and engineers with expertise in renewable energy storage technologies, on-shore chip manufacturing, optical-computational applications and other specialties.

The Knight Campus Graduate Internship Program, with its combination of hands-on training in cutting-edge science and exceptional professional and leadership training, will play a key role in setting up students to be among the most competitive jobseekers on the market, said Stacey York, co-principal investigator on the grant and director of the materials science tracks in the KC GIP. The program has a 98 percent graduation rate and students earned an average internship salary of $67,000 per year in 2021. Oregon Pathways aims to increase enrollment in the Knight Campus Graduate Internship Program by students from underrepresented groups, including from low-income backgrounds, by 20 percent after six years.

# PHASE TWO ADVANCES BIOENGINEERING, APPLIED SCIENCE TRAINING AND REAL-WORLD IMPACT

Phase 2 of the Knight Campus' evolution of development is now underway with a continuation of the transformative, human-centered design of Phase 1 and an emphasis on advanced bioengineering, applied science training and new technologies.

Phase 2 will provide the latest tools for students and faculty to create and study cells and tissues, enabling new avenues in medical diagnostics and personalized medicine. It will double the campus' capacity for research and development of new biomedical technologies with additional room for our expanding academic programs, spin spaces to incubate new startup companies and a state-of-the-art new core facility. Phase 2 is made possible by a second $500 million gift from Penny and Phil Knight for the campus bearing their names. Additionally, the Oregon legislature has approved $10 million to support cutting-edge technologies in Knight Campus building 2, a 185,000-square-foot, multi-story bioengineering and applied science research facility located along Riverfront Research Parkway. State investment will support the build-out of a real-time, machine-learning fueled, integrated tissue characterization and bioprinting facility. In coordination with the Clean Room and the 3D Printing/Rapid Prototyping Fabrication facilities in Building 1, the development of this biocharacterization facility will support our aspiration to become a leader in scalable biotechnologies.

**READ MORE:** accelerate.uoregon.edu/phase-2

PHOTO: Artist rendering of south facade at Riverfront Parkway Bridge

CONNECTIONS

# FOSTERING DIVERSITY THROUGH CULTURE, INCLUSION INITIATIVE ENTERS NEW PHASE

The success of the Knight Campus Graduate Internship Program's Inclusion and Diversity Initiative is easy to recognize.

Since the initiative's launch in 2017, representation of women and underrepresented groups in KCGIP's chemistry and physics tracks has increased by 2 1/2 times. Over 59% of students in the most recent cohort identified as female or from groups traditionally underrepresented in STEM fields, surpassing national averages.

However, the initiative's success goes well beyond numbers. Through a multi-tiered approach that includes strategic recruiting, scholarships, trainings, voluntary workshops and an annual symposium, the initiative has established a culture that prioritizes inclusion, respect and a greater understanding of crucial issues around diversity, equity and inclusion.

Established in 2017 with a 5-year/$200,000 overall commitment, including a $100,000 gift from Thermo Fisher Scientific and $100,000 in program matching funds, the KCGIP Inclusion and Diversity Initiative strives to create a more inclusive and diverse environment for students by fostering new perspectives across the entire program while also increasing representation through strategic recruitment.

Now, the initiative is ready to enter a new phase. With a total of $250,000 in recent commitments from MKS Instruments, Thermo Fisher Scientific and the program, a new scholarship fund will allow continued strategic recruitment for the next 5 years as well as expanded access to workshop facilitators. Targeted recruiting strategies will extend to schools and professional conferences with strong representation.

"The success was possible because of commitment from leadership, staff, faculty, alumni and students," said Stacey York, Director of Materials Science Tracks. "The brightest spot for me has been how students and alumni have consistently demonstrated leadership through empathy, courage and openness to new ideas. They built a cohort that really values inclusion, equity and diversity as much as technical prowess. Now they're taking those values into their careers."

**READ MORE:** internship.uoregon.edu/inclusion_initiative_enters_new_phase

# BIOENGINEERING PROGRAM ATTRACTS TOP TALENT

This fall, the Knight Campus bioengineering doctoral program continued to expand, adding 13 new graduate students to the Knight Campus.

This year's class includes students with many transdisciplinary research interests, ranging from applying machine learning to the development of therapeutics to using mechanical engineering skills to regenerate bone tissue.

Our new students recognize our mission to deliver societal impact, and they are already starting to make a difference.

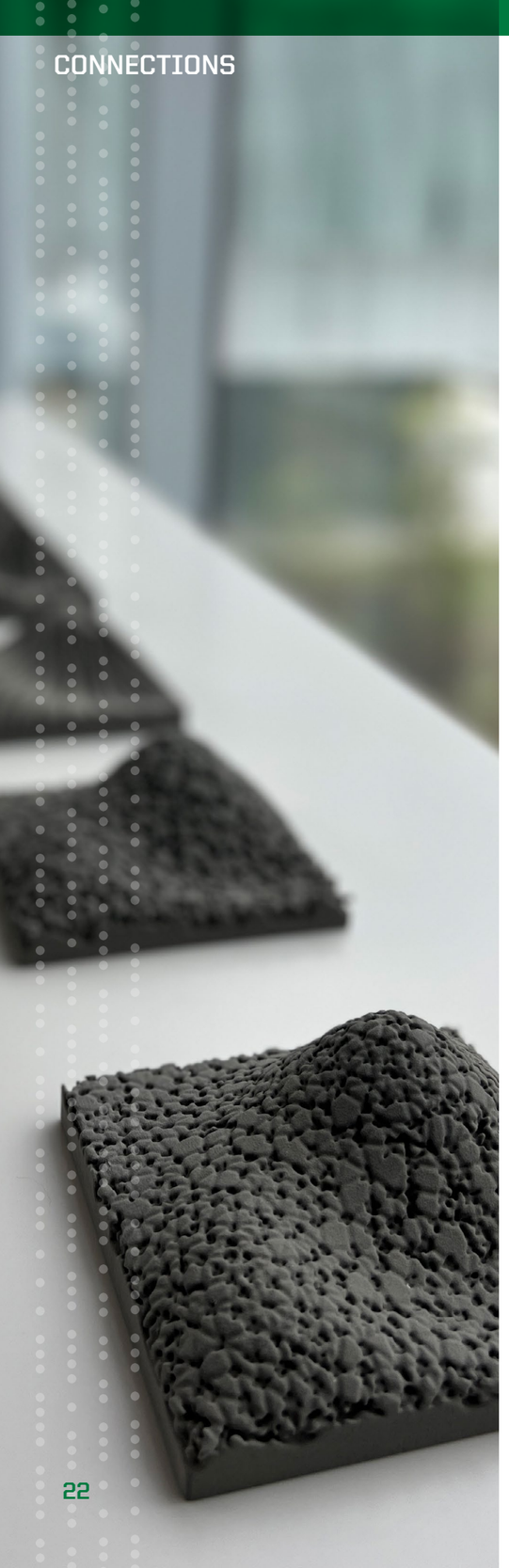
**READ MORE:** bioengineering.uoregon.edu/2022-cohort

## KNIGHT CAMPUS 2021-22
## A Year in Pictures






PHOTOS:
1. Bob Guldberg threw out the ceremonial first pitch at PK Park on April 26
2. On June 28, the Sky Bridge was illuminated to commemorate the anniversary of the Stonewall Riots
3. The Knight Campus celebrated its 6th birthday on Oct. 16
4. Basketball great Bill Walton visited the Knight Campus on Dec. 5
5. The Dalton Lab celebrated after the Oregon Bioengineering Symposium on Oct. 7
6. The Knight Campus Celebration and Awards ceremony drew more than 100 students, staff, faculty and friends on Dec. 9



## ART MEETS SCIENCE AT THE KNIGHT CAMPUS

Philomath, Oregon-based “rural artist” Karin Bolender has more in common with scientists in the Knight Campus than many might realize. An “artist-researcher” who playfully calls herself “principal investigator” of the Rural Alchemy Workshop (R.A.W.), Bolender was the first featured artist in the Center for Art Research Project Incubator Program, a joint program between the Knight Campus and the College of Design generously funded by the Ford Family Foundation.

The program affords artists working in any medium the opportunity to explore and conceptualize new work as a part of a vibrant, interdisciplinary research community that is supported by cutting-edge facilities and technical staff. Residents’ primary workspace was at the Knight Campus with access to UO School of Art + Design facilities. The program was born out of Center for Art Research and Knight Campus’s goals to create nimble systems that catalyze innovation and discovery by responding to the needs of individual’s specific research agendas.

“This program takes the interdisciplinary vision of the Knight Campus to new heights by bringing together artists and scientists in the name of creativity and experimentation,” said Moira Kiltie, associate vice president and chief of staff at the Knight Campus.

More than a half-dozen artists served as CPI Fellows in 2021-2022, including artist Mary Polites who hosted a pop-up exhibit on May 5 on the second floor of the Knight Campus.

Read more: https://accelerate.uoregon.edu/art-meets-science

**READ MORE:** accelerate.uoregon.edu/art-meets-science

“Design for Living Systems” featuring digitally fabricated models that display the investigation of growing media, species, and digital materials by Mary Polites.





## RESEARCH AND COLLABORATION YIELD INNOVATION

The Wu Tsai Human Performance Alliance at Oregon is an interdisciplinary network involving scientists, clinicians, engineers, coaches, athletes, performers and professionals in a wide array of fields from across the global community. Case in point: Sports Product Design master’s student Gabi Lorenzo’s capstone thesis project connects researchers, product designers, sports scientists and women athletes. Under the mentorship of Susan Sokolowski, professor and director of the UO’s Sports Product Design Program, Lorenzo integrated a wearable sensor developed by UO researchers into the midsole of a distance running shoe and tested it among a group of women runners.

The Wu Tsai Human Performance Alliance at Oregon “The goal is how can this be imperceptible to the runner, while collecting data that’s accurate and usable for the runner,” Lorenzo said. “It allows us to learn what’s happening to the foot instead of what’s happening to the shoe. That is arguably more important to the runner, what’s happening to their body.

The sensor, an optical-based device, which measures forces based on the relative change in light of different wavelengths reflected from a surface of unique color patterns, was the subject of a recent research paper. It leverages new technology developed by Keat Ghee Ong, a professor in the Phil and Penny Knight Campus for Accelerating Scientific Impact.

The idea for the sensor originated with Ong, whose “aha moment” occurred while installing a strip of LED lights in his daughter’s room when he envisioned the sensor’s patented 3-color optical monitoring. Mike Hahn, director of the Bowerman Sports Science Center, and postdoctoral scholar Michael McGeehan identified the potential value of such a sensor in the field of biomechanics. The device, they determined, could be used to measures shear forces – unaligned forces pushing one part of the body in one direction, and another part of the body in the opposite direction – that can lead to injuries and other problems for athletes. Identifying a need for a small, low-power and low-profile sensor, Hahn and McGeehan approached Ghee and wrote a grant proposal together.

**READ MORE:** accelerate.uoregon.edu/preventing-injury-improving-performance

# HEAL FASTER.
# BE HEALTHIER. LIVE BETTER.

Buoyed by NIH grants totaling nearly $5 million, three Knight Campus researchers are merging engineering, science and medicine to improve health

Synthetic biologist Calin Plesa, computational biochemist Parisa Hosseinzadeh and bioengineer Marian Hettiaratchi came to Oregon from around the world to improve lives through discovery. The three early career faculty members share one of the Phil and Penny Knight Campus for Accelerating Scientific Impact's trademark research neighborhoods, where principal investigators specializing in complementary fields focus their teams, labs, and life's work on societal impact. Less than two years after starting at the Knight Campus, the three researchers received National Institutes of Health grants totaling nearly $5 million, supporting powerful research with the potential to help us heal faster, be healthier and live better



RESEARCH
AND AWARD
HIGHLIGHTS

**Marian Hettiaratchi** | assistant professor
Marian Hettiaratchi joined the Knight Campus in 2020. Prior to that, she was a post-doctoral fellow at the University of Toronto. Her research focuses on combining chemical and biomedical engineering approaches to create effective biomaterials to deliver proteins for tissue repair.

Hettiaratchi's NIH project addresses treatment of severe injuries that often result in impaired tissue regeneration. She is seeking to generate a biomaterial platform to enable the precise delivery of multiple proteins from a single material. Because this biomaterial can be easily adapted to different types of proteins and tissue injuries, it has the potential to enhance repair in many different tissues.

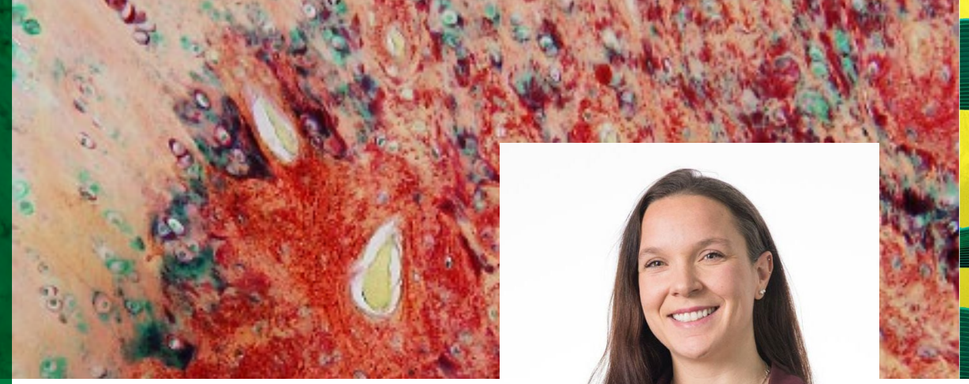
**Parisa Hosseinzadeh** | assistant professor
Parisa Hosseinzadeh joined the Knight Campus in 2020. Her work focuses on the development of new tools to enhance human life, especially through protein and peptide design and the use of large data. Before joining the Knight Campus, she worked as a postdoctoral fellow in the lab of David Baker at the University of Washington's Institute for Protein Design.

Hosseinzadeh's NIH project is focused on generating peptides – small chains of amino acids, the building blocks of proteins – as powerful, novel therapeutics peptides could be the solutions to deadly diseases such as cancer, new viruses, and antibiotic-resistance.

**Calin Plesa** | assistant professor
Calin Plesa joined the Knight Campus in 2019. His research interests lie at the intersection of biochemistry, protein engineering, microbiology, synthetic biology, genetics and technology. Before joining the Knight Campus, he was a postdoctoral fellow at UCLA.

Plesa's NIH project addresses the growing need for antibodies for both basic research and therapeutics. Currently there are major limitations in the availability of antibodies and our ability to develop new antibodies. This research aims to create a platform for generating and testing antibodies for every protein present in an organism, around 20,000 in humans. It promises to be an order-of-magnitude improvement over current high-throughput methods of generating antibodies.

**READ MORE:** accelerate.uoregon.edu/neighborhood





GABRIELLA LINDBERG

## RESEARCH AT THE INTERFACE OF BIOLOGY, CHEMISTRY AND TECHNOLOGY

At the Knight Campus, Gabriella Lindberg has found an environment where she can combine all her interests – her love of biology, her passion for chemistry and her affinity for 3D printing and other bioengineering technologies.

“This is why I love my job so much, I get to combine my passions,” Lindberg says.

Since arriving on campus in the spring of 2022, Lindberg has been busy hiring postdocs and research staff and setting up her lab, which is pursuing a blueprint to bridge the gap between engineered and native musculoskeletal tissues. She received a New Investigator Grant from the OHSU Medical Research Foundation to develop a 3D-Bioprinted Bone Marrow Model and funding from the Wu Tsai Human Performance Alliance.

As Lindberg and her team develop smart chemical and biological toolkits for biofabrication and pursue other tissue engineering challenges, she is mindful of some of the ethical concerns of her research. She stresses the need to account for patient variability and to ensure that the technologies being developed don’t just apply to athletes or young and healthy patients, but can benefit the wider population.

Lindberg is enthusiastic about the opportunities the Knight Campus offers for teaching undergraduates and training graduate students. And having worked at a medical device startup for four years before pursuing her Ph.D., she is focused on collaborating with clinicians and those in private industry.

“The innovation focus of the Knight Campus is so exciting,” Lindberg says. “And the fact that we have a clean room in the building, to me that’s just amazing.”

**MORE DETAILS:** lindberg.uoregon.edu





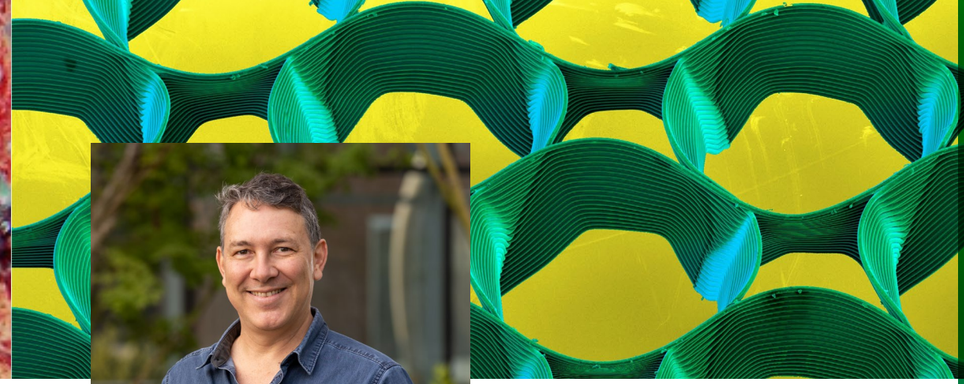




PHOTO: Cell Spheroid Scaffold – False-colored image of microfiber 3D printed scaffold, made with a single, continuous fiber that is interweaved to form “cups” into which cell spheroids can be placed.

PAUL DALTON

## DALTON LAB CONTINUES TO PUSH MELT ELECTROWRITING LIMITS

Was this the year the sleeping melt electrowriting (MEW) giant awakened? Materials scientist and MEW pioneer Paul Dalton thinks so.

The high-resolution 3D printing technology was originally developed for biomedical purposes and just five years ago existed in a handful of laboratories around the world. Today, with over 50 labs having MEW printers, there are also six companies competing to deliver the best MEW printer. Unfortunately, almost all this innovation has occurred outside the US.

“I’m on Team USA now and our strategy is to increase accessibility, allow talented people to innovate and solve challenges that address some of the most pressing medical issues,” Dalton said.

The researchers in the Dalton team are working together with a build-your-own printer concept, effectively reducing costs 50-fold with even better printing outcomes than existing commercial MEW systems. Since MEW was first invented and developed in Australia and Europe, there are few active laboratories in the US, but this is about to change.

“Our primary aim is to use this technology for the benefit of humanity,” Dalton said. “The Petri dish has become outdated for many purposes and there is a need for 3D scaffolds to fill this space. MEW does this quite nicely.”

**MORE DETAILS:** dalton.uoregon.edu

FELIX DEKU

## DESIGNING THE NEXT GENERATION OF NEURAL INTERFACES

Felix Deku, a leading expert in microfabrication, joined the Knight Campus in 2022 and hit the ground running in his ongoing quest to develop the next generation of neural interface technologies. A long-time collaborator of Tim Gardner's, Deku joined the UO as the result of an international search for a second Knight Campus lab in neural engineering.

Since his arrival, Deku has been busily equipping his lab, engaging with students and hiring staff who can assist in the group's efforts to engineer thin-film materials and develop novel fabrication methods for creating, what Deku calls, chronically reliable neural interfaces. The team studies the integration of the materials into the nervous system, including the brain and peripheral nerves. Additionally, Deku is interested in understanding the physiological effects of neuromodulation and their correlations to functional benefit.

Before joining the Knight Campus, Deku was the head of electrode engineering at Braingrade, a company developing brain-computer interfaces for cognitive enhancement, and neuromodulation therapies for Alzheimer's Disease and Dementia patients. Previously, he spent three years working at Neuralink, a Bay-Area company also focused on machine-human interfaces, where he provided technical leadership on electrode design innovation, advanced manufacturing technology, electrode material development, characterization and testing, as well as high volume manufacturing.

As Deku and his team develop brain interfacing devices and technologies in the Knight Campus, they will be frequent users of the state-of-the-art Knight Campus' Class 1000 cleanroom, supporting the fabrication of next-generation micro-and nano-scale devices on traditional semiconductor substrates as well as soft materials.

**MORE DETAILS:** deku.uoregon.edu



RESEARCH
AND AWARD
HIGHLIGHTS

COUROSH MEHENIAN

## BETTER PATIENT DIAGNOSES THROUGH MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Courosh Mehanian, a biomedical machine learning scientist focused on developing medical imaging software to improve disease diagnosis, continues to expand his expertise at the Knight Campus. An expert in machine learning and computer vision, Mehanian has a background in physics and a love of learning about biology and medicine.

The Mehanian Lab develops machine learning algorithms to solve healthcare problems relating to the detection and diagnosis of disease or the prognosis of health risks. Work his lab has done on this front has included pneumonia and malaria, which account for an estimated 800,000 deaths annually and 400,000 annual deaths, respectively, predominantly among children in low and middle-income countries. When diagnosed effectively and rapidly through improved screening methods, these kinds of diseases can often be treated and bad outcomes averted.

In his previous role at the helm of the machine learning group at the Bill Gates-owned Global Health Labs, Mehanian was focused on using biomedical technologies to solve global health challenges. At the Knight Campus, he is extending his research in medical AI applications by participating in the Wu Tsai Human Performance Alliance at Oregon – with a focus on how to prevent injury in athletes based on AI-modeling of historical data, and how injuries can be quickly and accurately diagnosed and triaged with AI-based interpretation of point-of-care ultrasound imaging.

"My work is all about making people healthier and their lives better," Mehanian said. "Whether you are blessed with good health or facing health challenges, medical imaging will be a part of your healthcare at some point. Knowing that your medical images are being analyzed by the latest AI models trained by world experts is reassuring."

**READ MORE:** accelerate.uoregon.edu/biomedical-machine-learning-scientist




ROBERT GULDBERG

## CUTTING-EDGE BIOENGINEERING FOR MUSCULOSKELETAL REGENERATION THE FOCUS OF RESEARCH PAPER

Musculoskeletal injuries and disorders are the leading cause of physical disability worldwide, affecting an estimated 1.7 billion people. A review paper co-authored by researchers in the lab of Robert Guldberg, vice president and Robert and Leona DeArmond Executive Director of the Knight Campus, provides an overview of the latest technological advances targeting musculoskeletal disorders, including recent efforts in translating state-of-the-art bioengineering approaches to therapies for musculoskeletal regeneration.

The paper, “Translating muskuloskeletal bioengineering into tissue regeneration therapies,” appeared in the journal Science Translational Medicine.

“It’s such an exciting time because the convergence of the latest bioengineering technologies with materials science, biology, and data science is now enabling advancement of therapeutic options like never before,” Guldberg said. “These advances offer hope to effectively treat previously uncurable musculoskeletal problems such as osteoarthritis that cause so much unrelieved suffering.”

The researchers conclude that a number of factors, including new platforms for in-vitro models, new technologies in cellular therapy and advances in biomaterial design, immunomodulation and machine learning are all helping to pave the way for the next-generation of multi-component bioengineering therapies.

Tyler Guyer, a third year Ph.D. student in the Guldberg Lab and a co-author on the paper, contributing to the project presented an opportunity to delve deeper into research both inside and outside of his own area of expertise. Guyer’s research examines the body’s immune response to trauma, particularly to bone trauma.

**READ MORE:** accelerate.uoregon.edu/cutting-edge-bioengineering-musculoskeletal-regeneration-focus-research-paper



RESEARCH
AND AWARD
HIGHLIGHTS

KEAT GHEE ONG

## ONG LAB CREATES IMPLANTABLE BIOSENSORS FOR CUSTOMIZED HEALING

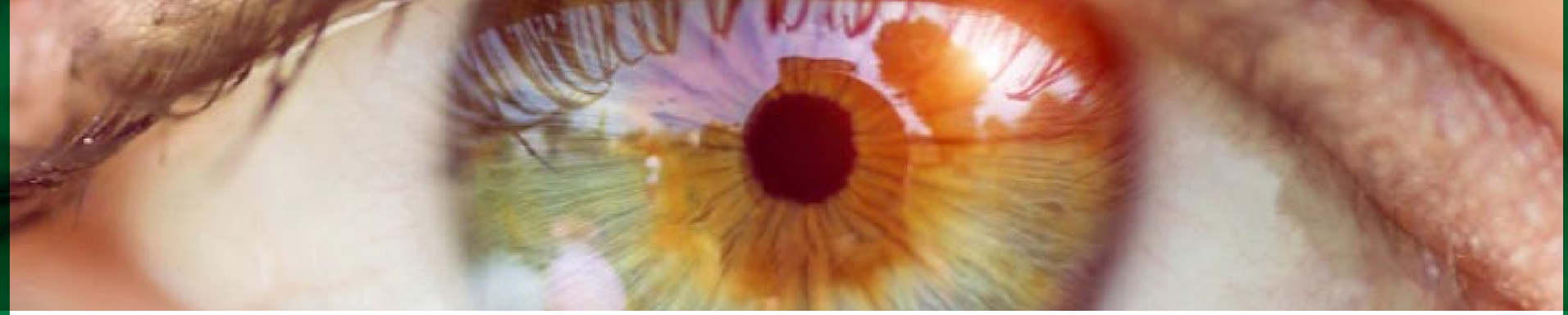
From ligament or tendon tears to bone fractures, not one person recovers in the same way. It’s this knowledge that led Knight Campus professor Keat Ghee Ong to undertake development of implantable sensors that measure environmental cues throughout healing.

Ong began asking patients and surgeons what improvements they want to see in medicine. A major concern was wanting to know what happens after tissues and sinew are sewn back together or bones are reset. These medical professionals wanted to know if healing times could be individualized for greater precision. From there, Ong began developing a prototype using radio-frequency identification (RFID) technology, similar to that found on some credit cards or library tape stickers.

Ong co-founded the company Penderia Technologies with Robert Guldberg, vice president and Robert and Leona DeArmond Executive Director of the Knight Campus. The firm is developing smart implants to optimize physical therapy rehab after orthopedic surgeries such as rotator cuff repair and ACL reconstruction. Ong provides his expertise in implantable wireless sensors and Guldberg offers his experience in orthopedic injuries, treatments, and products. Technical contributors include sensor and startup expert Salil Karipott, and electronics, device, and biomechanics specialist Michael McGeehan.

**READ MORE:** accelerate.uoregon.edu/customized-healing

PHOTO: Keat Ghee Ong (left), professor at the Knight Campus for Accelerating Scientific Impact, stands with Mike Hahn (right), professor of Human Physiology and associate director of Human Performance Alliance.



RESEARCH
AND AWARD
HIGHLIGHTS

**BALA AMBATI**

## SCIENCE KNIGHT OUT TALK FOCUSES ON THE CORNEA AND VISION SCIENCE

Knight Campus ophthalmologist and research professor Bala Ambati has seen a lot over the course of his 25-year career.

A leading eye surgeon, vision science pioneer and medical missionary, he has helped repair or restore vision to countless patients around the world, and researchers in his lab in the Knight Campus continue to develop treatments to prevent or reverse blindness, provide clearer vision and reduce the need for corneal transplants.

As the featured speaker at Science Knight Out, an annual community science talk sponsored by the Knight Campus, Ambati focused on the cornea, the window to the eye, and provided an overview of the history of vision science. His April 2022 talk, “Eye on the Cutting Edge: Healing the Window on the World,” highlighted research from his lab, including a new gene therapy that could eventually provide an alternative treatment for Fuchs’ endothelial corneal dystrophy, a genetic eye disease affecting roughly one in 2,000 people globally. Currently, the only treatment is corneal transplant, a major surgery with associated risks and potential complications.

An ophthalmologist at Pacific Clear Vision Institute in Eugene, Ambati explored some of the breakthroughs in vision science over the past 20 years. A visionary researcher and highly regarded clinician with an entrepreneurial drive, Ambati co-founded iVeena, a startup focused on developing an eyedrop for corneal strengthening and an implant for drop-free cataract surgery. In addition to performing thousands of cataract surgeries, LASIK and other vision correction procedures, he has also served as a volunteer eye surgeon in Ghana, Zambia, India, Panama, Indonesia, the Philippines and Malaysia.

“I love having the ability to take care of my patients and to help them see,” Ambati said. “I also love the ability to work with a fantastic group of people here at the Knight Campus and in my lab to come up with the next generation of cures and treatments to help patients around the world for years to come.”
Ambati’s talk marked the sixth installment of Science Knight Out lecture series, which dates to 2017.


**READ MORE:** accelerate.uoregon.edu/knight-campus-talk-focus-cornea-and-vision-science



TIM GARDNER

## GARDNER LAB CONTINUES TO BOOST NEURAL ENGINEERING PROFILE

Neuroengineer Tim Gardner was inspired to come to Oregon by the vision of the Knight Campus and the emphasis on neural engineering in his endowed chair position.

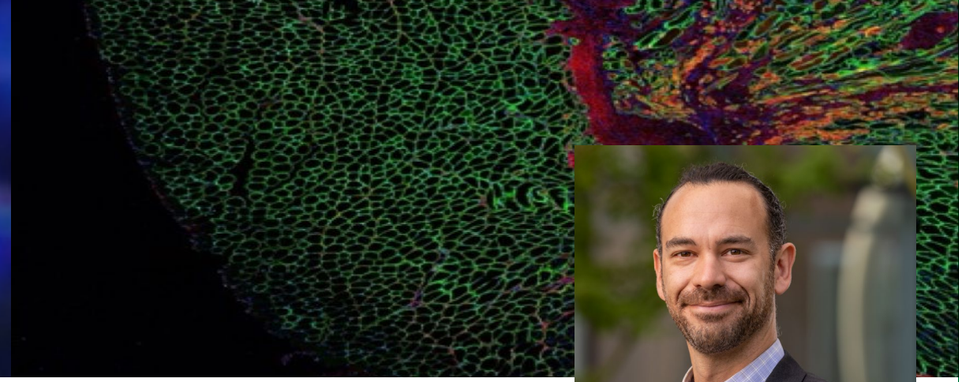
“We have been fortunate enough to participate in this amazing community – helping to launch core research facilities, establishing a graduate program in bioengineering, building a new research laboratory, and collaborating with multiple startup companies” Gardner said.

Together with longtime colleague Felix Deku, Gardner is working to attract graduate students and build a critical mass in the area of neural engineering. Gardner has initiated a project to develop some of the highest resolution 3D printed implantable devices made anywhere in the world. The team built a custom 3D printer capable of making features as small as 1/100th the diameter of a human hair and developed clean-room microfabrication processes to produce functional implants for the brain and small nerves. For this project, postdoctoral scholar Morgan Brown won the top poster award at a national conference for neural interface engineering this spring.

A second project is showing exciting results. Gardner seeks to develop a cell-therapy approach to combat age-related brain diseases. The project seeks to efficiently deliver new neurons to the brain without requiring injections of cells into the brain. Prior attempts at injecting cells into the brain have shown limited cell integration, and the injection process is invasive. In the new study, the stem cells used by Gardner are delivered to the brain without requiring invasive injections. The cells migrate widely and integrate as mature neurons. This project could ultimately provide a promising avenue to combat age-related decline of brain function and degenerative neural diseases.

**MORE DETAILS:** gardnerlab.uoregon.edu





RESEARCH
AND AWARD
HIGHLIGHTS



NICK WILLETT

## BIOMEDICAL ENGINEER NICK WILLETT SITS AT THE INTERFACE OF ENGINEERING AND CLINICAL PRACTICE

Nick Willet has brought his expertise in tissue engineering and regenerative medicine therapies for musculoskeletal injury and disease to the Knight Campus.

Using combinations of stem cells and biomaterials, the Willett Lab is developing novel technologies and therapies to create new tissues and regrow and repair different musculoskeletal tissues after loss, either due to disease, trauma or age. The research team works primarily with bone, muscle and cartilage in the hopes of treating ailments ranging from degenerative diseases to sports injuries like meniscal and tendon tears to traumatic injuries such as blast wounds or injuries due to car accidents. One major focus is arthritis, which affects an estimated 23% of all adults in the U.S. – over 54 million people.

“I like to sit at the interface between engineering and clinical practice and to collaborate with people on either side to help bridge engineering (and medical) technologies,” Willett said.

Regenerative rehabilitation is one area of research emphasis for the Wu Tsai Human Performance Alliance. Willett is leading the initiative to help athletes and the general public recover from injuries more quickly and effectively. He says well-worn methods of treating injuries with metal screws and pins are being supplanted by groundbreaking approaches to training, treatment, and data analytics that have the potential to promote tissue regeneration and help pave the way to better healing.

In addition to advancing the mission of the Knight Campus by bringing knowledge out of the lab and into the world, he looks forward to another form of scientific impact.

“The other impact is educating that next generation of biomedical engineers and life science trainees so that they can go out and create better solutions to all of the challenges that are facing us as a society,” Willett said.

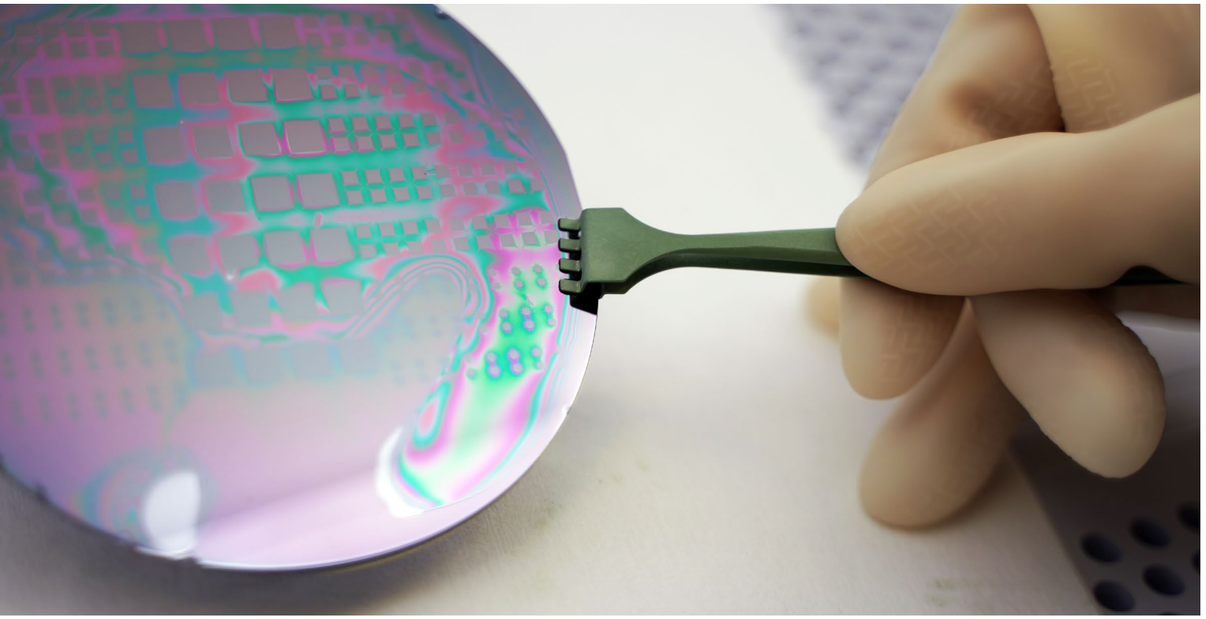
**READ MORE:** accelerate.uoregon.edu/noted-biomedical-engineer-joins-knight-campus-faculty

# HIGHLIGHTS

- In fiscal year 2022, the Knight Campus faculty were awarded over $9.4 million of sponsored research support, bringing the total of Knight Campus grant award dollars to the UO since 2019 to nearly $20 million.

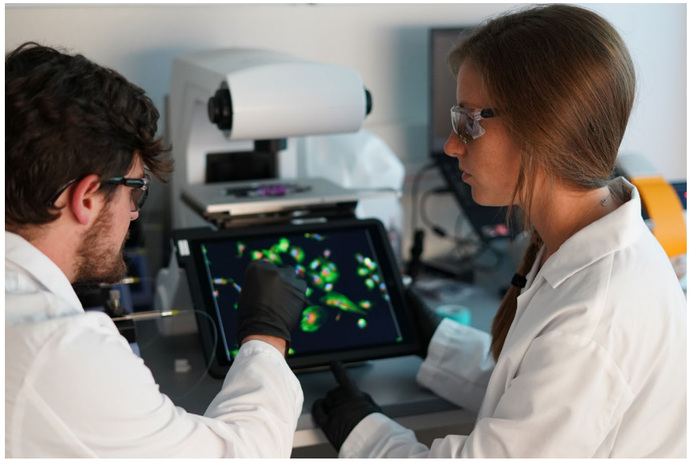
- Of particular note is the significant number of proposals submitted in fiscal year 2022 by a growing Knight Campus research community. The chart to the right represents support for sponsored research and programs in the Knight Campus in fiscal year 2022.

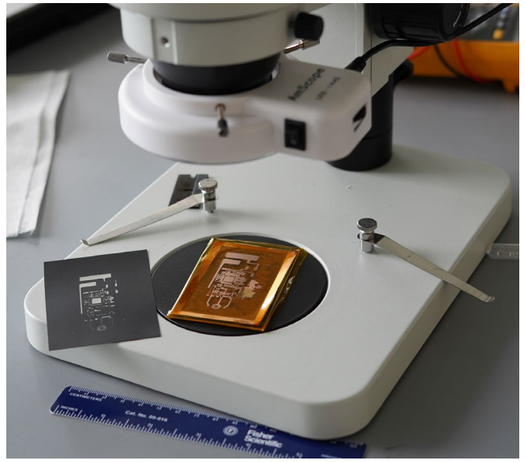
| | |
|---|---|
| Total Number of Awards | 21 |
| Total Awarded (includes F&A) | $20.4M |
| New philanthropic gifts and pledges in support of research | $6.1M |
| Total Number of Proposals | 45 |
| Total Submitted (includes F&A) | $30.5M |
| Total Awards Cumulative FY19-22 | $102.4M |





EXTERNALLY SPONSORED RESEARCH



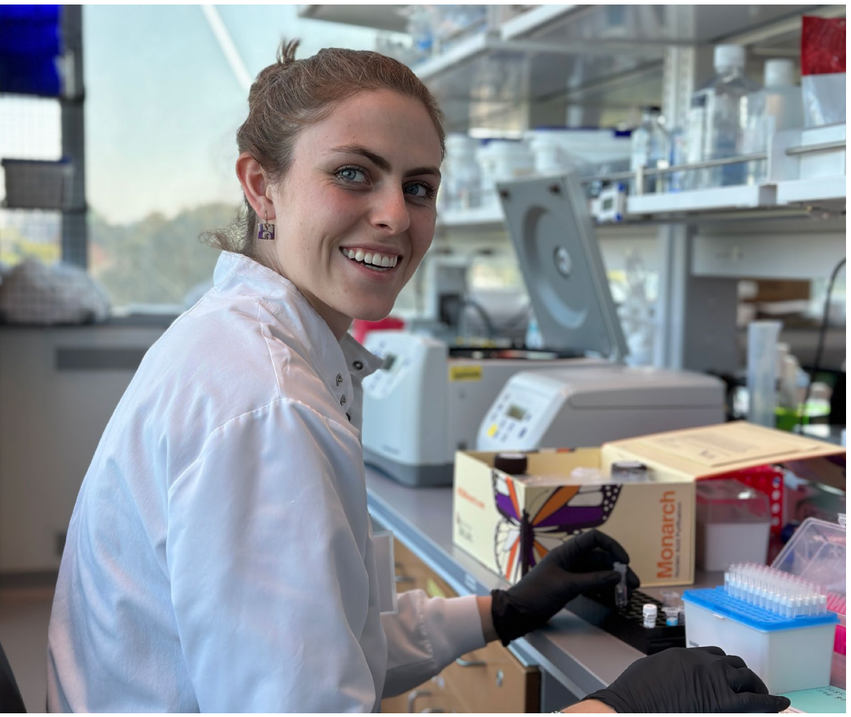


**$6,161,487**

**in new gifts and pledges in FY22 – beyond the Knights' visionary philanthropy**

## IMPACT OF GIVING

- **16** undergraduate scholars, launching careers in STEM, with support from **six first-time** Knight Campus donor families.
- Investments in Knight Campus Graduate Internship Program that will pilot **new programming** to attract and support diverse students training in bioinformatics.
- **One** new Innovation Center that will incubate start-up companies in Knight Campus Building 1 and one equally sized Innovation Center planned for Knight Campus Building 2.
- **One** new project that extends the Wu Tsai Human Performance Alliance's reach from the Knight Campus, across UO Athletics and UO's Data Science Initiative, and one new endowment that will sustain the Human Performance Alliance at Oregon beyond its initial 10 years.




"I am proud to be a member of the program because it places me within a group of motivated students who are prominent leaders in scientific research and engagement at the University of Oregon."

– Carmen Resnick
Knight Campus Undergraduate Scholar

PHOTO:
Knight Campus Undergraduate Scholar Carmen Resnick is mentored by assistant professor Calin Plesa.





## FASTER FORWARD

### $5 million Papé family gift accelerates the Impact Cycle in Knight Campus

The Papé family of Eugene recently gave $5 million to support the Papé Family Innovation Center, facilities dedicated to–and designed for–translating academic research into societal impact. For example: surgical devices, new medical therapies, and novel treatments for disease.

"My dad attended the UO, then Randy and I, then our children. We're so pleased that the university is taking bold steps toward a bright future. Other people are noticing, including faculty members who want to be here, students who want to attend, and donors who want to give. They all want to be a part of it."

– Susie Papé
Board chair of The Papé Group Inc.

**The Papé Family Innovation Center**

- Making it easier and faster to translate academic research into patents, inventions, startup companies, and collaborations with industry
- Building specialized facilities designed to nurture new spinoffs–one of the most cost-effective ways to transform academics into entrepreneurship
- Offering opportunities for UO students to participate in translational research activities
- Leveraging other points of excellence in the Knight Campus: programs, people, and centers that foster applied research–and help translate that research into applications that benefit people
- Creating spaces that are necessary (but not widely available) for starting new biotech companies

UNIVERSITY OF OREGON

# Phil and Penny Knight Campus for Accelerating Scientific Impact

1505 Franklin Blvd.
Eugene, OR 97403-6231

accelerate.uoregon.edu