

CALIFORNIA  
STATE UNIVERSITY  
LONG BEACH

# Quest

ISSUE 8 FALL 2022

Pursuing Innovation Through Research

## Changing the Optics

A new  
optics lab  
aims to  
improve  
early cancer  
detection



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**Quest** is a publication of the Office of Research and Economic Development at **California State University, Long Beach**

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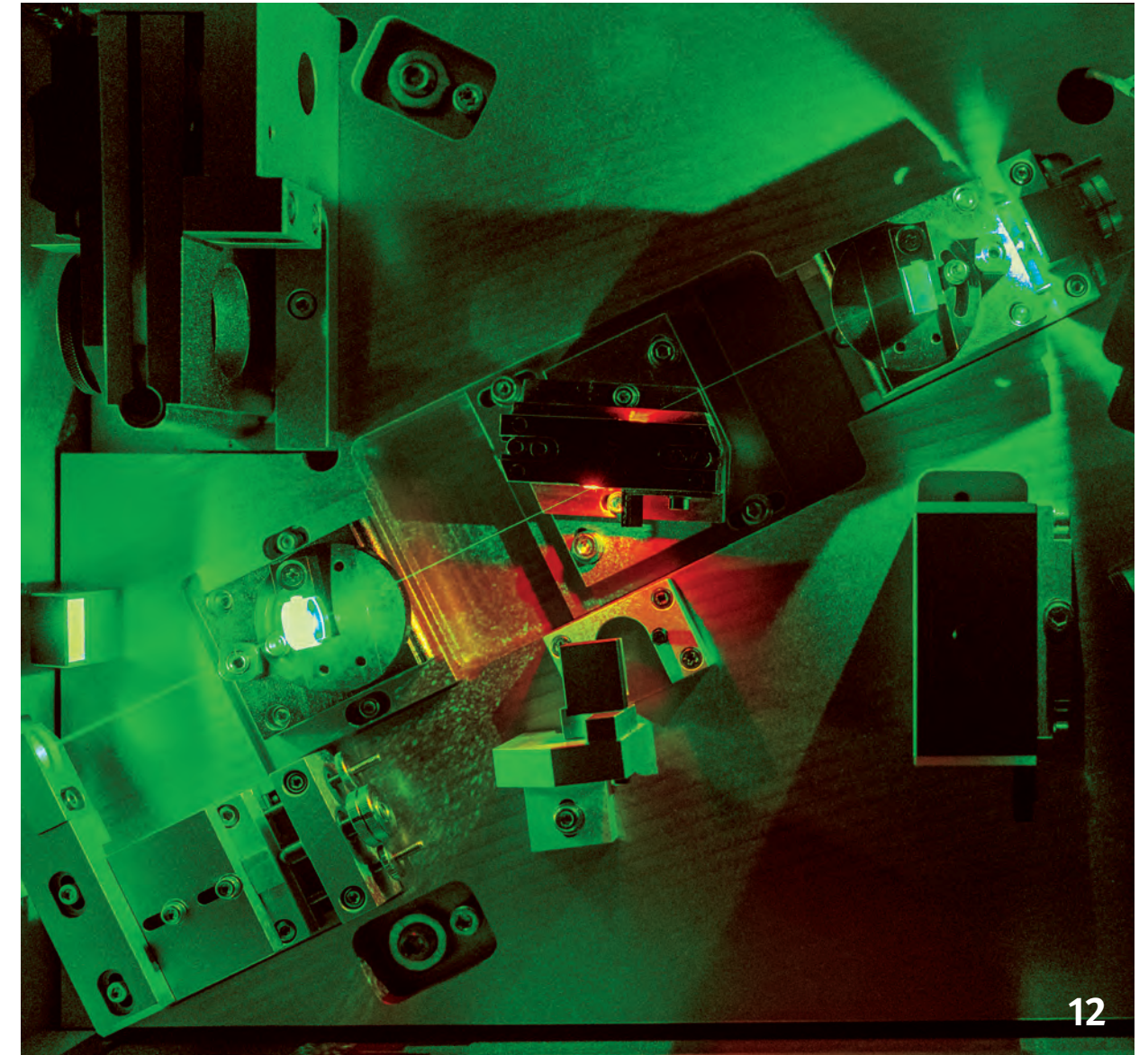
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*ON THE COVER: Dr. Aftab Ahmed inspects a novel plasmonic sensor, a tool in his work on early cancer detection.*



## MESSAGE FROM THE PRESIDENT

Welcome to *Quest*!

We produce this publication to highlight the research accomplishments of Beach faculty and students. Like previous editions, this version of *Quest* illustrates the broad breadth of faculty interests and accomplishments. As you delve into the magazine notice that topics range from Physics to Marketing to Education to Augmented Reality to Public Health and many points in-between. Several of the projects are aimed at providing outstanding experiences for students as well as adding to the research discovery literature.

We describe CSULB as a student-centered and research-driven university. Our recent elevation to “R2” status recognizes the high intensity of research that is being accomplished at The Beach. We’re proud of this accomplishment and equally proud of how many undergraduate and graduate students are actively involved in research.

I celebrate all the faculty members and students featured in this *Quest* and, of course, the many, many others who are also doing important research and student mentorship across all of our colleges. Discovery enriches teaching and offers both mentors and mentees the special joy of being fully immersed in an area of study.

I am also grateful to faculty who attract external funding to offer special programs in our community, especially notice the focus on mental health in the schools in this issue. Research and evidence-based practice allow us to manifest our value, *The Public Good is our Responsibility*.

Enjoy reading about the work done by just a few of our fabulous faculty members.

**Go Beach!**

Jane Close Conoley, Ph.D.



PAGE 4: Health equity is at the forefront of a new public health initiative. Illustration by Felipe Flores.

# PUBLIC HEALTH STEPS INTO THE FUTURE

The future of public health information technology is here.

COLLEGE OF HEALTH AND HUMAN SERVICES

WORDS: Britt Julious

With the help of a \$10 million grant funded through the Department of Human Services by the American Rescue Plan, CSULB will spearhead new programming to develop culturally relevant public health information technology through the lens of health equity. Professor **Kamiar Alaei**, Department Chair of Health Science and the person who spearheaded this grant, says this new initiative is part of his larger goals of interdisciplinary and interdepartmental collaboration on public health at CSULB and across the globe.

Alaei joined CSULB two years ago and changes have been swift, including updating textbooks and reviewing all offered courses and materials for the department. He also helped pilot new course changes and reworked specific programs like their internships, which ran in collaboration with the department of health-care administration.

“That was part of my motivation: how can I bring new interdisciplinary programs here?” Alaei asked. “Any new idea was welcome, was piloted and tested.”

Alaei was motivated, in large part, by a desire to bring new concentrations to students in the graduate and undergraduate programs at CSULB as well as develop new courses that speak to the unique challenges of health science in a contemporary world. Those programs include a school of population and public health within the department of science and the department of healthcare administration. Rather than siloing off faculty to one discipline, Alaei believes in an interdepartmental approach to health science, aiming to incorporate different disciplines like computer science, biomedical engineering, mechanical engineering and information systems, among others, to address pertinent needs.

“Because I joined here during the pandemic, I didn’t have a chance to see other faculties in person during the first year,” Alaei recalls about his initial plans. “But I was able to reach out to all of the faculties and build up trust, partnership, and collaboration. From one side, this is kind of a challenge, but at the same time, the opportunity [gives] faculty more flexibility to work on new ideas.”

This cross-disciplinary approach forms the basis of his new \$10 million grant. And while many California universities applied, including public and private institutions, only CSULB’s proposal was among the 10 selected from across the country.

As part of the grant, CSULB will help lead the California Consortium Public Health Informatics and Technology (CCPHIT) Workforce Development Program to recruit, train, and place more than 700 minority students in the public health workforce through paid internships and in-demand job placement. The hope is to improve COVID-19 data collection, fortify public health information technology services within the U.S., and grow representation of underrepresented and underserved communities within the workforce.

Inspired by the all-encompassing global impact of the COVID-19 pandemic, Alaei says his team was inspired to propose a plan that brought academia and a new workforce team together (comprised of those within the computer science, engineering, and public health fields) to develop new courses and programs to support underserved populations. “We have to understand what are the languages and what [is] the common ground to identify the mutual benefit,” he says about why working with multiple focus areas is important.

“We have to do the nontraditional approach if you are to overcome the existing challenges,” Alaei says. “If the traditional approach was working, we [wouldn’t] face these challenges. The existing ideas, the existing disciplines, are exhausted.”

Key to their plans is the implementation of partnerships, whether interdepartmentally, with other California higher-education institutions, or through a public-private sphere. “They are separated and disconnected, so how can we bring them back together?” he adds.

Work has already begun on the implementation of their plan through an ongoing need assessment survey. More than 300 different agencies from categories like the department of health as well as others in the public and private sector have been selected to better understand current needs within their areas of service. Are they helping the population on a large scale? Are health departments identifying gaps in treatment and services? And if so, what are the desired competencies to address these gaps? Although the survey has only recently been shared, Alaei says they plan to review, revise, and assess it every two years, “because the needs of every two years is different from the needs of today.”

Their team is also working on data mining, examining more than 500 current job postings on information technology (IT) and public health IT to better understand the current desired competencies and skills within the field to create learning modules for their graduate and undergraduate students. These modules may include everything from mini courses to associate degrees in partnership with community colleges to undergraduate and graduate certificates. Later, they also plan to implement a Doctor of Public Health degree with a concentration of public health IT. And for those not interested in returning to receive a degree, they also have non-credit options for working professionals interested in career training.

“Traditionally, faculties were only concerned about [doing] courses for accreditation. But how about the community’s needs? How about the industry’s needs?” Alaei asks. “We wanted to start from scratch. And this is new to a lot of faculty, but it’s exciting because they see the immediate impacts.”

In the future, Alaei will establish a school of population and public health at CSULB through funding from the grant. Later, he plans to create mini grants for the faculty of different disciplines so they may work together as an interdisciplinary team to create new courses and ideas.

Alaei also aims to create a center for global health and technology. “I think this is the time for me to bring the industry and faculty together, because traditionally, those faculties have great ideas, but they have to go to [national institutions],” Alaei says. They may have to write multiple proposals or each one takes numerous months to complete. But creating their own means of resources, no matter how small, can help expedite the research process and bring real solutions to everyday people.

“That would be my goal,” Alaei says. “Reduce the health disparity. And if you want to reduce the health disparity, we need the technology and information. We need data. We need evidence. That would be my hope, to have this new specialty cover the gap of the health disparity.” ■

“**We have to do the nontraditional approach if you are to overcome the existing challenges. If the traditional approach was working, we [wouldn’t] face these challenges. The existing ideas, the existing disciplines, are exhausted.**”

# DANCING AROUND REALITY

Dance and Design merge to create a one-of-a-kind experience.

COLLEGE OF THE ARTS

WORDS: Sylvia Rodemeyer

PHOTO: Site-specific dance performances create an on-demand immersive experience.

A reality-expanding collaboration between College of the Arts’ Dance lecturer **Erin Reynolds** and Design professor **Heather Barker** has resulted in an experience that transcends time and space. Incredibly, their augmented reality dance and design projects are tied to specific places, but a viewer can enjoy the performance from any place and at any time they choose to.

The Immersive Design Research Lab, under the leadership of Barker, was where Reynolds found a like minded researcher and their partnership formed. Typical of innovation, it was a bit of trial and error at the outset, but they built a lot of trust and confidence by having similar creative processes.

“We talked a lot about culture and space and how you measure that. As we integrate dance into spaces and into this sort of digital past, present, future, we think of the dance creating a sense of place,” Reynolds says of the origins of their project. Barker added, “What’s important and similar to dance is that design has a very identifiable research methodology that is different from the sciences. Design processes are quite similar to the way dancers work. You develop the project by doing instead of starting out with a well-defined hypothesis - that comes later.”

What resulted was an entry for the Long Beach Augmented Reality Challenge, most noticeably, the Long Beach



“

**We talked a lot about culture and space and how you measure that. As we integrate dance into spaces and into this sort of digital past, present, future, we think of the dance creating a sense of place.**

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COLLEGE OF THE ARTS

City Dance Mosaic Mural Augmented Reality Experience. The experience is a dance performance piece that utilized Facebook’s Spark AR technology to bring specialized dance performances to specific locations, able to be experienced by scanning a QR code via a phone. In this particular instance, viewers can enjoy Reynold’s choreography and Barker’s design at the mural at Harvey Milk Promenade Park.

“Erin and I would talk about shared priorities and values to define the project in ways that make a lot of sense for a designer and for a dancer. And as a gesture of trust, you hand it over... and then, in an incredible return gesture of trust, they offer it back,” Barker says of the collaboration.

The project and future collaborations are possible because of the 2015 IDRL Nissan Design America grant that helped set up the Immersive Design Research Lab, and a subsequent ORED interdisciplinary grant that helped employ students to scale the structure, as well as partnering with the City of Long Beach Smart City initiative.

“The lab is a vehicle for collaboration in all sorts of work that has to do with navigating and creating across actual and virtual spaces: virtual reality, augmented reality, immersive performance. It’s been a really fantastic way to engage with community partners that have a shared interest,” Reynolds says of the focus of the lab.

An ultimate goal of the project and technology would be to expand the offerings to more site-specific spots and per-

formances. It would serve double duty as both an artistic archive and an entertainment destination.

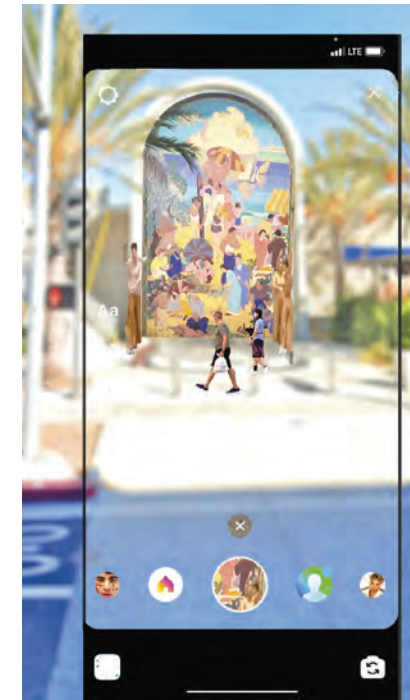
“A space that is something measurable and defineable, but a place is where something has happened. A place has more value than a space, and that makes it more valuable on the Smart City side, because it helps answer the question of how do we bring people back to engage when they could just sit and watch Netflix or pull people back in because of the pandemic,” says Barker.

The duo can’t help but see the greater benefits of providing more art to the larger community of the city. “Every performance that has ever happened in a place will pop up and you can capture it. For example, people come through Long Beach on a cruise and stay for a night and there aren’t necessarily a ton of events happening on the day that they’re there, but they can walk through and trigger all kinds of past performances that have happened and watch them on their phone,” Reynolds says of the possibilities present for this output. They also appreciate that viewers can engage on their own terms and on their own time and, hopefully learn something.

Barker and Reynolds are eyeing another augmented reality challenge that is occurring this summer, and are considering crafting a new story with the large amount of immersive storytelling dance footage they already have in a new context for the next challenge.

They say that when they embarked on the project last year, they were pushing the edge of possibilities in terms of technologies but advancements have made the Spark AR tool and augmented reality technologies in general, even more robust.

“It was kind of a new tool and was mostly for selfie-type filters and we were really pushing it to do ‘world-facing’, which is much more interesting for peo-



*ABOVE: Viewers can engage on their own terms and on their own time, launching the performance by utilizing the QR code reader on their phones.*



ple that are working in urban, rural, or place based dance, but you had to really stretch the tool to do that. Capturing 3D content is becoming much more feasible and in that year of time, the tools are so much better,” Barker says.

As the technology evolves, so does their commitment to the project. Since working together, both have a deeper knowledge of the other’s specialty, and think one can only enhance the other.

“As researchers, we create knowledge. I think it’s important to think about how you investigate and learn about the world. One of the most interesting ways to do that is through human bodies and how they interact, so that’s where we find a collaborative research premise,” Barker says. ■



# A SELLERS MARKET

How in-platform advertising tools are changing the e-commerce landscape.

**COLLEGE OF BUSINESS**  
 WORDS:  
 Sylvia Rodemeyer

The e-commerce platforms most of us have grown accustomed to delivering everything from groceries to wedding dresses have matured behind the scenes. While the goal is the same for the consumer: to order the product they want when they want it, platforms have offered a variety of sellers the use of robust marketing tools, especially advertising tools, previously only available to larger brands. Generally, these tools are used for both customer recruitment

and customer retention. As e-commerce platforms have expanded, many have started providing marketing tools to help their sellers attract customers and enhance user experience. As it stands, platforms are interested in learning how those tools are being used by the sellers. College of Business Professor, **Peter Yang**, discussed the inspiration behind his research: “No one has systematically explored how platforms’ business customers choose marketing tools, taking

into account that they compete with each other in the online marketplace.”

Yang and his collaborators set out to understand how business customers choose between service offerings provided by an e-commerce platform. In 2022 he published *Platform Service Offering to Business Customers: Strategic Considerations in Engendering Seller Use of Marketing Tools*, which was co-published with USC’s Sha Yang and Shantanu Dutta.

Yang’s main data was sourced from a large e-commerce business in China meant to be analogous to Amazon’s offerings, both as leaders in their markets and providing marketing tools to sellers.

Yang’s modeling framework incorporated two strategic considerations in sellers’ decisions of marketing tools: competitor and consumer reactions. To capture sellers’ consideration of competition, they modeled sellers’ differing abilities to predict how competition affects their decisions. For seller consideration of consumer response, they studied a sales-response model in which sales are affected by the marketing tools used.

Their analysis indicated that strategic considerations are important and their results show that, in making decisions on which marketing tool(s) to use, successful sellers tend to differentiate themselves from the competition. It was also found that sellers with a higher rating tend to be more strategic.

“When people are searching on Google, they’re often just browsing, but if they’re on Amazon, they’re more likely in a buying mode,” Yang says of consumer behavior on the platform. This behavior makes the conversion rate much higher. This discrepancy in conversion rates has caused a drastic shift in the way marketing dollars are spent by business customers that sell on Amazon and platforms like it and has shifted the landscape of advertising from off-platform to in-platform to catch buyers when they are more likely to make a purchase. That shift now

accounts for Amazon earning \$31 billion in revenue from ads per year, per CNBC.

The format and placement of ads isn’t the only innovation. In the last decade, the ability to track what you browse via cookies, tokens, and customer history gives platforms insights that they then share with sellers through their marketing tools, creating specifically targeted ads, often based on individual behavior.

“Theoretically it is a win-win-win scenario—consumers are happy, sellers are happy, and the platform is happy,” Yang says.

When the targeted ads perfectly predict the toothpaste you use and serve you an ad as a reminder right before you run out, most of us don’t mind our data being tracked. Still, there are increasing numbers that ask not to be tracked and policymakers and tech companies are listening by creating regulations or tools to limit individualized tracking. More and more often, consumers don’t feel comfortable being individually tracked and feel like sometimes the platforms know their preferences before they do.

Tech giant Apple recently changed the policy of their iOS to provide the option to not be tracked and Google followed suit. With less tracking, there is a trade-off in efficiency for privacy. Yang sees the trend moving toward more context-based ads versus behavior-based ads.

“If I’m reading an article about cars it’s realistic to assume I’m interested in cars, but if I leave and get more car ads on other sites, that makes me feel less comfortable,” Yang says of the prevailing sentiment.

As a researcher, Yang appreciates tracking for the data but sees its privacy concerns. And yet, the information available via these methods is alluring: “Today is the age of big data and now we can analyze practically everything,” he says.

What’s next for Yang? Something just as relevant to modern times: exploring how mass shootings impact gun purchase behavior. ■

COLLEGE OF  
ENGINEERING

WORDS:  
Shannon Koehle

# NEW OPTICS ON CANCER DETECTION

It's not an optical illusion:  
Aftab Ahmed's dream  
of detecting cancer earlier  
is now a reality.





W

e're not very good at detecting cancer early, yet.

This is just one thought that consumed Dr. **Aftab Ahmed** for years.

But there was little he could do to address it, until now.

While some of us baked banana nut bread and binged Tiger King as the COVID-19 pandemic exploded across the world, the electrical engineering assistant professor scoured the Internet for grants.

"My research work is related to optics and electromagnetics, so to do any meaningful work we really need state-of-the-art facilities," he said.

It took nearly a year between applying and re-

ceiving the grants, but he was recently awarded a Department of Defense (DoD) grant to design an optics and laser lab at CSULB and a National Science Foundation (NSF) grant to design an optical biosensor. These total \$689,000.

"The first two days I was just unbelievably happy, and relieved at the same time that I will be able to do the work that I like to," he said of learning about the awarded grants. But now it was time to get to work.

The new optics lab contains a tunable continuous wave laser that allows one to work with any wavelength from ultraviolet to infrared and a tunable pulsed laser system, which produces very narrow puls-

es. These two instruments alone cost about \$350,000.

He has also added a spectrometer, which detects and measures electromagnetic radiations; a C-band laser for optical communications experiments; and two simulation packages, finite difference time domain (FDTD) and COMSOL Multiphysics in order to conduct theoretical analyses and numerical calculations before the hands-on portion begins.

Dr. Ahmed also invested in vibration isolation optical tables, which basically float, because the experiments are sensitive to noise. These prevent vibrations on the floor, for example, from impeding experimental results. For the same reason, the lab is on the ground floor.

The optics lab is now the first of its kind at the school and rivals anything found at top tier universities.

"We got the big, expensive components necessary to begin innovative optical experiments," said Prof. Ahmed, "and hopefully we can add more and more to it with time."

**The First Experiment:** With the equipment secured it was finally time to start digging into the science. The first experiment taking place is being funded by the NSF grant. Dr. Ahmed is developing an optical biosensor for early detection of diseases, specifically cancer.

"I'm very much excited because I've had this idea for some time and I proposed it to NSF and they were willing to support this project," he explained.

Currently there are optical biosensors in the market and they use a method called surface plasmon resonance (SPR). They have been around for over a decade, shared Dr. Ahmed, and the reason why they are so popular is they have a very high sensitivity.

They are label-free, real-time optical detectors, which are very desirable, he added.

But, they have a drawback. They cannot detect very tiny bio molecules, an example being cancer biomarkers at the earliest stage.

If a patient has an early stage cancer and the amount of biomarkers that they have in the blood sample is very limited, the current system cannot detect anything with a weight less than 500 dalton. This means the cancer would go undetected.

"The current method relies on using the Kretschmann configuration," he said, "so instead of using the Kretschmann configuration I proposed a

new type of coupling method to couple light to surface plasmons and we showed theoretically that this will improve the sensitivity by about 50 times. And that increase in sensitivity now will allow us to detect early stages of cancer and other diseases."

Ahmed's innovative method has all the same advantages as the Kretschmann configuration in that it's label-free, real-time, and is a very simple approach. Further, it does not require more steps or complex fabrications of new systems or structures. The early results are so encouraging, in fact, that he's hoping to get a patent.

**The Beginning of a Dream:** This new method to better detect cancer early was a dream Dr. Ahmed has considered for many years.

In fact, the idea first emerged while he was working on his PhD in Canada at the University of Victoria. While there a biomedical industry partner supported the research where he patented a previous biosensor design. But he knew it could be better.

"I kept on thinking, 'how can we improve?' because I realized that it still couldn't diagnose a patient in the early stages of cancer. And for many diseases, early detection is the key to successful treatment. If you can catch the disease at an early stage there is a very high probability of survival."

While others in his field kept trying to improve the sensitivity of the Kretschmann configuration, he realized he needed to challenge this prized approach to find the answer.

"I saw the potential," said Dr. Ahmed. "It's an easy way to improve the sensitivity while maintaining reproducible, reliable results." He describes it as "a new family of biosensors."

And he's no longer working alone.

**Two Students Join the Optics Lab:** Thuy Nguyen is an electrical engineering graduate student at CSULB and received an email about the opportunity to get involved in the new optics lab.

She developed an interest in biosensors during a nanotechnology course and visited Dr. Ahmed at the lab to ask if she could join his research team and make it her thesis project. Since then she also developed an interest in potentially working for a medical device company when she graduates next school year.

But this path wasn't smooth. Nguyen grew up

PAGES 12-13: Controlling light-matter interaction at nano-scale enables a new family of optical biomedical sensors.

ABOVE: Prevailing cancer detection research focused on improving the sensitivity of existing tools and methods. Dr. Ahmed looked elsewhere for inspiration.

“

**I kept on thinking, ‘how can we improve?’ because I realized that it still couldn’t diagnose a patient in the early stages of cancer. And for many diseases, early detection is the key to successful treatment. If you can catch the disease at an early stage there is a very high probability of survival.**

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in Vietnam and even completed her undergraduate degree in biotechnology there only to learn it was not transferable to medical schools in the US. And so, with the support of her family, she started over.

“It’s just a few more years and then you can use it for the rest of your life,” they said of working toward yet another degree, this time in the US. “It’s much better than suffering for lots of years later.”

She moved to California and attended community college before transferring to CSULB. She received her biomedical engineering undergraduate degree, but slowly discovered she enjoyed research and no longer wanted to head to medical school.

Over the years, she’s also put an emphasis to learn more about the culture and communications in America so she would be prepared for her future career and credits CSULB with easing this transition.

Although she did learn some English while living in Vietnam, it wasn’t until she was in the US that she really picked up the language and admits even now, “When I come here some people talk really fast and sometimes I cannot get it, but I try my best.”

All her hard work has paid off as she assists Dr. Ahmed on the optical biosensor research.

“We just simulate on the computer, on the software to see how the results respond to the parameters we change and to see how the result comes out and then later, when he says it’s ok to do on the

model, then we’ll move to the next step,” she said.

She’s also joined by undergraduate student Estevan Espinoza who’s majoring in electrical engineering after transferring to CSULB from Long Beach Community College in fall 2021.

Espinoza met Dr. Ahmed a few times through HSI-STEM, a grant program that helps foster success for Hispanic and low-income students. He also requested to work on the optical biosensor.

“For me it was a great fit because I’m dealing with something that is very rooted in physics, but it applies into the medical field,” he said. Though he admits he never expected to end up working on this type of research.

“I didn’t think of going into research at all,” he said. “My idea was to simply finish my engineering degree in electrical engineering and then just go into the medical field on my own terms. The fact that I didn’t know that [this type of research] existed is just mind-blowing.”

He added that Dr. Ahmed first trained himself and Nguyen on the software and, most importantly, safety in the lab as the lasers they are working with are very dangerous. Then he exposed them to his work on improving cancer detection. “It’s been a wonder to work for him,” said Espinoza, “He really is a wonder.”

**Cancer Detection Isn’t the Only Ongoing Experiment:** In addition to designing the optical biosensor, Dr. Ahmed is engaged in numerous other experiments at the new lab like using nanophotonics to develop high-speed optical modulators.

When we send information via fiber optics, the light beam is modulated, he explained. “The current modulators are quite high speed, they are not slow, but we are trying to make them about 1000 times faster.”

If this experiment continues as planned, Dr. Ahmed and his team will have had a personal hand in dramatically increasing your Internet speed as they try to move from gigahertz into the terahertz range.

“We are using nanotechnology to develop optical modulators for next-generation communication systems,” he said, and called the progress “encouraging.”

He is certainly busy in the lab and has many av-

*PHOTO: Safety is a top priority in the lab when working with such powerful lasers.*



enues of research he could delve into now that the school hosts state-of-the-art equipment.

In fact, the optics lab could support work in energy conversion (improving photovoltaic); microscopy (trying to see things that are too small to see); spectroscopy (see spectrum of different molecules and ID which ones are present); terahertz technol-

ogy (scanning for explosives, as one example); and nano-photonics (which could take over electronics).

But he does try to find balance in life. For the last ten years he’s also played squash. “I play twice a week. I never miss.” ■



# GOING THE DISTANCE

Supporting student success for the whole university journey.

COLLEGE OF  
NATURAL  
SCIENCES AND  
MATHEMATICS

WORDS:  
Shannon Koehle

While walking around campus it's easy to forget that behind closed doors students and faculty are engaged in potentially life-altering experiments, but that's exactly what's occurring in the Hall of Science building at CSULB, thanks in part to a grant secured by Physics Professor **Michael Peterson**.

CSULB and Ohio State University (OSU) physics departments have been in touch for years coordinating on the American Physical Society Bridge Program that identifies students

who have shown success and want to complete a PhD upon graduation from CSULB. And while at a related conference, the two departments decided to take their partnership to the next level and applied for the Partnership for Research and Education in Materials (PREM) grant awarded by the National Science Foundation (NSF).

The two universities met regularly over Zoom during the pandemic to complete the proposal and were ultimately awarded \$800,000, according to Dr. Peterson.

ABOVE: A new grant creates a partnership with OSU and a commitment to students at every part of their journey.

The grant is made up of two components—research and education. The objectives are to propel the ongoing research projects taking place at CSULB and to simultaneously help ease the transition between graduate and PhD studies for CSULB students, who would potentially even transfer to OSU as well as initiate and foster cross institutional collaborations, which are often hard to get started and keep going due to lack of funding or distance.

**Focus is on Student Success:** “[OSU] wants to foster underrepresented minority success but they don’t always know what the incoming students are dealing with and what they’re struggling with,” said Dr. Peterson, who explained that many CSULB students do not take a linear path while completing their education and are not always the best test takers.

But students involved in the PREM grant who attend OSU will already have a project they’re working on, a research group assigned to them at OSU, familiarity with faculty, and will have visited the campus numerous times.

Additionally, PhD programs in the physics field often take 5-6 years to complete. “That gets in the way of success because a lot of students look at that timeline and just think, well I can’t do this,” explained Dr. Peterson, especially because their master’s credits from CSULB are not always accepted.

Sometimes when they arrive to start their PhD, said Professor Peterson, the students are forced to re-do courses they’ve already taken or test-out since some are arriving just out of their undergraduate coursework. This delay in completing their next degree is an obstacle Dr. Peterson and others at CSULB are trying to help overcome with grants like PREM.

“We want to produce PhDs and highly trained students that are ready to either go into academia or go into the workforce in materials science,” he said.

“For us, we want to send our undergraduate students and our masters’ students to top schools for their PhD,” said Dr. Claudia Ojeda-Aristizabal, Associate Professor of Physics at CSULB, “and this is a natural bridge. So my hope is that after this, Ohio is more motivated to take our students.”

“I hope it serves as a great pathway for all our departments—chemistry and physics—to get new PhD students in the coming future,” added OSU Chemistry Professor Joshua Goldberger. “That’s definitely one of the long-term goals.”

While this portion has not kicked off yet due to high COVID-19 transmission rates, students will have the opportunity to visit the OSU campus as part of the grant.

There they will partner with a professor and work as an undergraduate researcher in one of the labs, explained Professor Goldberger. They’ll also have a graduate student mentor, will get involved in various training opportunities, attend lectures on potential career opportunities, and even take a trip to Argonne National Laboratory in Illinois.

“The students are getting tons of opportunities to use great equipment at OSU and computation techniques and they’re learning all kinds of cool things,” added Professor Peterson.

Students can also expect visiting faculty and postdoc students from OSU to provide in-person lectures on the CSULB campus and get involved in various experiments.

But, the grant is so much more than just what OSU has to offer.

As Dr. Ojeda shared, “My students are very excited about doing experiments, writing papers; we are doing science, and this is all facilitated by the NSF [grant].”

**Science is a Priority, Too:** The research component of the grant is also complex and delves into three fields of study.

The first is topological aspects of magnetism, which, simply put, is when thin films of

magnets with strange geometries are studied.

The second involves an interest in quantum materials in reduced dimensions. Essentially one can make very thin layers of materials and then stack them like Legos, explained Dr. Peterson, to tune the magnetic properties by mixing materials and adjusting the structures.

And the third area of focus is in bio-molecular topology and properties. Dr. Peterson shared that DNA molecules can form very complicated links and faculty are experimenting with different conditions and knot theory to better understand what is occurring.

Each project, he said, fosters interactions between faculties at both universities as they find overlapping projects they are both interested to work on.

One such example is the dynamic between Professor Goldberger and Dr. Ojeda.

“[OSU] had just created a new family of magnetic materials that looked like they had some sort of interesting physical properties associated with them and Claudia’s an expert in measuring the electronic structure of these materials and we thought it was a natural starting point for collaboration to investigate these systems,” said Professor Goldberger.

Dr. Ojeda added, “Josh and I shared an interest in materials that are two-dimensional. These materials are made up of atoms that arrange themselves in a certain way that bring certain scientific properties that can be useful for applications seen in electronics.”

Ultimately, Dr. Ojeda was able to work with her students, including Derek Bergner, to conduct experiments using materials provided by Professor Goldberger.

Bergner heard about the opportunity to work with Dr. Ojeda from Dr. Peterson and joined the grant research team in October 2021. Since that time he says the students have been working on two main techniques.

“

**To do cutting-edge materials research you need to work with lots of different people who have lots of different expertise to answer really fundamentally unique and important questions.**

”

They used electron transport to learn more about the magnetism, voltage, and temperature of Professor Goldberger’s material that Bergner refers to as a crystal, as well as angle-resolved photoemission spectroscopy (ARPES)—the main technique Bergner is involved with.

“Pretty much what I do is I go to the Advanced Light Source in Lawrence Berkeley National Laboratories and we applied for beam time, successfully got it in October, and I pretty much shoot high energy photons at the crystal.”

This allows him to study the band structure, or different energies and velocities the electrons can have that live in the crystal, and, with some help from other scientists, he gets samples ready, shoots them with photons, then studies the distribution, and “some important physics come out of that,” he said.



*ABOVE: The opportunities and partnerships available through the CSULB and OSU collaboration allow for students to get hands on experience with advanced techniques.*

*LEFT: Dr. Peterson secured the grant that will bolster ongoing research projects.*

The fact that he is involved with this level of scientific experimentation is still mind-boggling. As he shared, “I wasn’t at all prepared to go to a four-year school.” Instead he attended San Diego Canyon College first before transferring to CSULB.

Now, he happily works alongside Dr. Ojeda who he speaks of very highly.

“I can’t say enough how lucky I was to meet Dr. Ojeda because not only is she one of the most empathetic and hardest working women in North America, but I’m doing novel, advanced, and cutting-edge science at Long Beach. I’ll work with her for as long as she’ll let me.”

However, he graduates next year, so their time will come to an end sooner than he’d like at

which time he plans to continue on the PhD track and ideally attend a university that has access to a synchrotron—a type of cyclic particle accelerator.

In the meantime, he and Dr. Ojeda are both excited to soon publish their lab results that used the ARPES technique and expect a few more research papers to emerge due to the grant funding.

As Professor Goldberger explained: “To do cutting-edge materials research you need to work with lots of different people who have lots of different expertise to answer really fundamentally unique and important questions.” And that’s exactly what the NSF grant allowed.

The grant lasts for three years and then CSULB and OSU can re-apply for further funding. ■

# HELP IS HERE

Not Alone @ The Beach expands its reach.

COLLEGE OF  
LIBERAL ARTS

WORDS:  
Sylvia Rodemeyer

The Association of American Universities' 2019 Campus Climate Survey reported an overall 13% rate of nonconsensual sexual contact at U.S. colleges. Not Alone @ The Beach (NATB) has served as a resource for survivors and preventative education since 2015. But as the ways students interact with each other have shifted over the years, so has the efforts of NATB.

NATB is the primary source of cutting-edge gender and power-based violence prevention education, engagement, and outreach to CSULB students, faculty, and staff. Their goal is to authentically engage community and campus partners to offer a holistic response to sexual violence and a safer, inclusive campus community.

**Shelley Eriksen** initially joined as a program evaluator at the impetus of the program and is now the Program Director.

"I take an intersectional lens to the questions that are important in public health as it relates to gender, sexuality, and race, and most recently violence prevention for women's and men's well-being on college campus," Eriksen says of her approach.

NATB has received funding via a grant from the California Governor's Office of Emergency Services since 2015. As part of the grant mandate, a Campus Confidential Advocate, employed by student health services, is accessible to students year round and online in person.

The Campus Confidential Advocate is a certified rape crisis counselor who is available to provide confidential support services students who have been affected by sexual violence or misconduct. The advocate can also assist those who have been affected by stalking, domestic, or dating violence by linking students to appropriate resources.

NATB serves anywhere between 100-1000 stu-

dents every year in their outreach, advocacy, and prevention services. Survivors can receive support services no matter how long ago the sexual assault or abuse occurred.

## CSULB students affected by sexual violence can receive assistance through:

**Crisis Intervention:** Confidential and sensitive consultation to assist in the recovery on behalf of victims/survivors.

**Advocacy:** Intervention with other individuals, departments, and agencies on behalf of victims/ survivors.

**Accompaniment:** Support during medical exams, counseling appointments, university & criminal investigations, and court appointments.

**Information and Referral:** Helping survivors know their rights and options and linking them to support services on and off-campus.

"In the last year or two we've really solidified our relationships with our community and campus partners. When you're trying to prevent sexual assault and provide advocacy services, it really



ABOVE: Director Shelley Eriksen has been with NATB since 2015.

does require a monumental team effort. We've really begun to be seen and understood as an advocacy and prevention resource on campus," Eriksen says, "It's always a challenge to be known in a complex university system and to ensure students are aware of the resources available to them, but I think a real benefit is that we've been here since 2015 and we are increasingly a known entity."

A series of dedicated graduate assistants, a robust social media presence, engaged interns, and campus events have helped NATB mature and operate from the perspective of the students they aim to serve.

One of NATB frequent campus collaborators is improv dance troupe InterACT. InterACT has been recognized for raising awareness about sexual assault. Their performances focus on promoting empathetic and comforting responses from audience members, and providing a model where audience

## Sexual Assault Facts

A majority of sexual assaults are committed by someone known to the victim and a majority happen in familiar settings.

1 in 5 college women are sexually assaulted.

1 in 6 men are sexually assaulted in their lifetime.

(via RAINN.com)

members can rehearse proactive behaviors that can potentially disrupt a sexual assault episode. During performances audience members are invited on stage to become active participants, rather than passive observers. The performances allow audience members a space to rehearse assertive communication strategies and safely and creatively intervene to prevent violence. interACT performances are complemented by Mentors in Violence (MVP) leadership trainings currently offered at the CSULB Leadership Academy.

Like so many things impacted by the COVID-19 pandemic, NATB had to significantly shift how they interacted with students when most campus activity moved online.

"We've really relied on our online presence and savvy. Like everyone else, we really had to shift gears and we also shifted in the awareness programs we offered. Risk goes up in other ways, risk doesn't go away just because we're virtual. We adapted our outreach to reflect those changes in risk," Eriksen says.

That shift also included an increased focus on internet safety, online dating safety, virtual meditation and yoga, and online bystander leadership training. As the campus continues to welcome more students and organizations back to in-person events, NATB hopes to encourage more student advocacy through their new peer education initiative.

"We hope to engage more students in talking with each other and working with each other in creating a violence free campus as a central part of what it means to be a Cal State Long Beach student," Eriksen says. ■

# CULTURALLY RELEVANT STUDENT SERVICES IN A POST-PANDEMIC WORLD

Changing the narrative of student and leadership experiences.

COLLEGE OF EDUCATION

WORDS: Britt Julious

It may be nearly 20 years since Dr. **Anna Ortiz** first joined the faculty at CSULB, but her past and current work will impact the lives of students far into the future. In 2019, Ortiz released “Student Affairs in Urban-Serving Institutions: Voices from Senior Leaders,” a research-based book examining the most commonly attended, yet routinely underserved institution of higher learning. Although her book was released prior to the COVID-19 pandemic, it was the learnings from years of interviews, data analysis, and research that helped urban-serving institutions like CSULB effectively communicate and connect with students during the most challenging era of the modern day world.

“I think the most important impact being at Long Beach has had on my research and my thinking has been its place as a comprehensive institution that primarily serves students in an urban area who go to college very differently than all the students that I learned about when I was in my [grad school] programs,” admitted Ortiz. “Most of the research on college students has definitely been done in predominantly white, traditional institutions.”

Urban-serving institutions, in contrast, operate in urban areas and are focused specifically on serving the needs of their surrounding communities. “At Cal State Long Beach, we have the Long Beach Promise,” she notes. “It’s one of the ways we’re engaged with the local community.” Ortiz describes “traditional” institutions as

ones where students go to college by “moving away” and “living in residence halls.” And although predominantly white, traditional institutions typically represent the college experience in the public eye, most college students don’t go to school in those kinds of environments.

“Most of our texts until recently—and I would say in the last fifty years—have all assumed that’s the way we go to college,” notes Ortiz. “And if we went in some way different, we were nontraditional students or we were commuter students. Acting as if we were this small group of students over here doing this thing when actually, it was a big group of students with a smaller group going to college in a [stereotypical] way.”

According to Ortiz, urban-serving institutions are largely disregarded in terms of understanding how they operate and why they are necessary, often resulting in less funding compared to flagship institutions. This results in a hierarchy of resources within higher education, with urban-serving institutions toward the bottom of that hierarchy.

Understanding these institutions became Ortiz’s focus. As part of her research, Ortiz and her graduate assistant interviewed vice presidents of student affairs at different urban-serving institutions using the same protocol to better understand student and leadership experiences.

“What are the challenges [or] successes?” Ortiz asked. “Organizationally, how did they

structure their work with other units on campus or within the community? How did they engage [with] the community?”

Then, they analyzed the data into themes that became chapters of her book. Volunteers from her initial group of vice president interviewees were invited to write a chapter in the book. Each was able to select a co-author of their choosing, from graduate students who worked on their campuses to assistant professors. This kind of participatory project allowed each chapter to reflect the diversity of each of the institutions, making for a richer volume of work.

It was through her work on urban-serving institutions that Ortiz began to develop culturally relevant student services, many of which were employed as the COVID-19 pandemic ravaged the globe and led to widespread lockdowns.

“After the pandemic, we’re talking a lot more about those things now, like taking a case management approach to student services, whether those are mental health or food or housing securing, or just basic [things like] academic advising,” Ortiz says.

Putting all of these elements together requires a more holistic approach to designing interventions for the academic experience of students. Many assume this means creating an on-campus multicultural center, but Ortiz says the work should be deeper and more specific.

Ortiz cites CSULB’s basic needs program as

a fundamental culturally relevant student service available on campus.

Established before the pandemic, Ortiz said the program (which does things like case management on a micro level and virtual counseling or advising) allowed the school to learn from previous experiences when serving students who attended school from home during the pandemic. Other parts of the program—from Zoom classes to virtual office hours to the “Beach Buddy” program (where each incoming student was partnered with a staff member who would provide regular check-ins)—ensured the school was “meeting students where they are, versus where we want them to be.”

Rather than assuming all students need the same thing (or need things that only apply to stereotypical institutions of higher learning), culturally relevant student services for urban-serving institutions understand that their students lead complex lives. Whether they must deal with commuting, working full-time, or family responsibilities, students at urban-serving institutions need programs and services that are willing to provide what they need in order to succeed.

Most recently, Ortiz has stepped into the role of interim dean of the College of Education. In the position, Ortiz will pivot from writing and researching to helping implement the work, something she finds challenging, but ultimately fulfilling.

“I look forward to having an impact in a different way; A more direct, practical impact within the college as a whole. I see it as now is the time the rubber hits the road. The things you write, read, and teach about? Now you have to do them.” ■

“

**It’s one of the ways we’re engaged with the local community.” Ortiz describes “traditional” institutions as ones where students go to college by “moving away” and “living in residence halls.” And although predominantly white, traditional institutions typically represent the college experience in the public eye, most college students don’t go to school in those kinds of environments.**

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# SPOTLIGHTING RESEARCH

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## COLLEGE OF THE ARTS

**David Waldman:**  
Professor

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## COLLEGE OF ENGINEERING

**Dr. Ehsan Madadi:**  
Assistant Professor

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## COLLEGE OF HEALTH AND HUMAN SERVICES

**Dr. Melissa Mathews:**  
Assistant Professor

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## COLLEGE OF EDUCATION

**Dr. Caroline Lopez-Perry:**  
Associate Professor

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## NSF CAREER AWARDS

**Dr. Fangyuan Tian:**  
Associate Professor  
College of Natural Sciences  
and Mathematics

**Dr. Perla Ayala:**  
Associate Professor  
College of Engineering

**Dr. Elena Grintsevich:**  
Assistant Professor  
College of Natural Sciences  
and Mathematics

*PHOTO: Human Umbilical  
Vein Endothelial Cells  
(HUVEC) forming vascular  
structures in a fibrin scaffold*



LEFT: Waldman dialing in the look of TED at Monterey in 2021 with Lighting Designer James Downey.

## Cinematography: Reimagining Approaches to Creative Communication

### COLLEGE OF THE ARTS

**David Waldman:**  
Professor

David Waldman has spent the past 20+ years working as a cinematographer and camera operator in a variety of genres including: feature films (Hot Tub Time Machine II, Max), feature-length documentary (Mr. Warmth: The Don Rickles Project, 2008 Emmy Award Outstanding Variety, Music, or Comedy Special), feature television (Entourage, Big Love, Head Case, Dinner with Don), television commercials for the Super Bowl, Grammys, and Academy Awards, to his ongoing work as the visual consultant and director of photography for TED-Talks, a collaboration since early 2008.

As Director of Photography for TEDTalks, Waldman has overseen more than 40 in-person conferences which entail him managing local crews, solving on-site technical and aesthetic challenges, and collaborating with different lighting and set designers to create individual looks for each speaker while focusing on showcasing their Idea Worth Spreading. Additionally, during the pandemic, Waldman remotely directed another 45 talks which presented a different set of challenges; most importantly discovering ways to create connectivity with a viewer through single camera angles (there are typically 5 to 9 cameras at a live event), and on consumer-grade cameras and lighting technology, with limited remote crew.

Waldman states that “as difficult as it was to innovate ways to accomplish connection in these environments, the lessons I learned fed directly into my approach to classes I taught remotely. Where was I going to place my webcam? Would a second webcam help or detract from student engagement? How should I light myself? And most importantly, how could I

remain flexible in my delivery of the core concepts of my lessons when I was unable to demonstrate equipment and give students hands-on experiences with movie gear?”.

Waldman notes his work “over the past 20 years, regardless of venue or genre is all focused on using the tools and techniques of cinematography in order to design bespoke, story-appropriate visual language choices that deepen the audience’s experience of emotional moments on screen; these could be dramatic or scary or funny- my goal is to stay away from the formulaic and to use the subtext of the script and performances to draw the audience in”.

Waldman goes on to say his work in “creating one-off visual language choices rooted in emotionally connective moments has evolved tangibly over two decades and has allowed for the development, evaluation, and reimagining of approaches to communication strategies between creative collaborators and the incorporation of new technologies into visual storytelling”. Waldman has presented these findings to 15 panel and workshop sessions at the annual University Film and Video Association conference over the past ten years, published a chapter on how a director might go about choosing a Director of Photography for their project, and visited other colleges as a guest artist. ■

## Nonprofit Organizations as Schools of Democracy

### COLLEGE OF HEALTH AND HUMAN SERVICES

**Dr. Melissa Mathews:**  
Assistant Professor

Dr. Melissa Mathews’ research agenda, teaching interests, and service commitments are motivated by her experiences in professional practice for more than 15 years. Before joining the Graduate Center for Public Policy and Administration faculty, she led nonprofit organizations as an executive director, conducted workshops for boards of directors and executive directors, and continues to provide consulting

support to inform governance and management practices. As a result of these experiences, Dr. Mathews is dedicated to public scholarship that strengthens professional practice within the nonprofit and public sectors.

Dr. Mathews’ research is focused on board and executive director dynamics within nonprofit organizations and the roles and contributions of civic engagement organizations in municipal governance. Specifically, she examines the contingent factors that influence governance and management practices and the extent to which nonprofit organizations serve as schools of democracy by embodying processes that contribute to civil society and democratic governance. Her research is timely given that the nonprofit sector is projected to experience a substantial leadership deficit, which significantly impacts Southern California due to the relatively large size of the sector. There are approximately 33,000 nonprofits within Los Angeles County alone. Dr. Mathews’ second line of inquiry also is relevant given increased public attention to the importance of democratic governance within the United States. Specifically, she seeks to advance an understanding of community engagement in municipal governance. Her most recent study investigated the roles of civic engagement organizations within the City of Long Beach. Dr. Mathews is presently engaged in ongoing research to support their activities and strengthen public participation.

As a former executive director, she was awarded approximately \$700,000 of grant funding. Dr. Mathews also recently received a Research, Scholarly, and Creative Activity grant from the College of Health and Human Services to conduct research within the regional nonprofit sector. This study contributes a much-needed qualitative dimension grounded in professional practice to the debate about what constitutes effective civic engagement. The findings also



advance an understanding of how to strengthen the capacities of nonprofit organizations and realize more democratic outcomes. Dr. Mathews looks forward to meeting growing interests among professional practitioners and CSULB students concerning the interactions of nonprofit management, civic engagement, and democratic governance. ■

## NSF Faculty Early Career Development Program (CAREER) Award Background

The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization. Activities pursued by early-career faculty should build a firm foundation for a lifetime of leadership in integrating education and research. NSF encourages submission of CAREER proposals from early-career faculty at all CAREER-eligible organizations and especially encourages women, members of underrepresented minority groups, and persons with disabilities to apply.

California State University, Long Beach has the honor of hosting three current NSF CAREER winners: Fangyuan Tian, Perla Ayala, and Elena Grintsevich. The entire BEACH community commends each of you for your hard work and dedication to student research.

**Fangyuan Tian:** The focus of Dr. Fangyuan Tian's research is to study the surface and interface chemistry of a type of porous materials, known as metal-organic frameworks (MOFs). These materials are composed of metal clusters linked by organic ligands by forming three-dimensional (3D) or two-dimensional (2D) structures. Due to their unique properties, MOFs have exhibited great potential for gas capture, separation, and storage. The NSF CAREER project in Dr. Tian's lab involves the study of 2D conductive and semiconductive porous crystalline thin films.

Electrically conductive materials have led a range of applications in energy storage, chemical sensing, electrocatalysis, and fuel cells. It is critically important to explore the electron transfer behaviors observed on the novel ultrathin porous materials, including MOFs, covalent organic frameworks (COFs), and their composites with conductive polymers. Dr. Tian's lab seeks to understand the charge transport behaviors in the above-mentioned materials using both experimental and computational approaches.

The project aims to enhance the scientific understanding of surface and interface interactions between crystalline coordination networks and semiconductors with combined analytical methodology and materials design. Moreover, the outcome of the project is expected to benefit the semiconductor industry and to guide future crystalline coordination-based device design.

More importantly, this CAREER project will provide early research opportunities to a diverse cohort of undergraduate

students at CSULB. This five-year project targets on increasing diversity in materials science. Meanwhile, outreach activities are designed to involve local high school students and the general public with an aim at improving scientific awareness and interest in materials research.

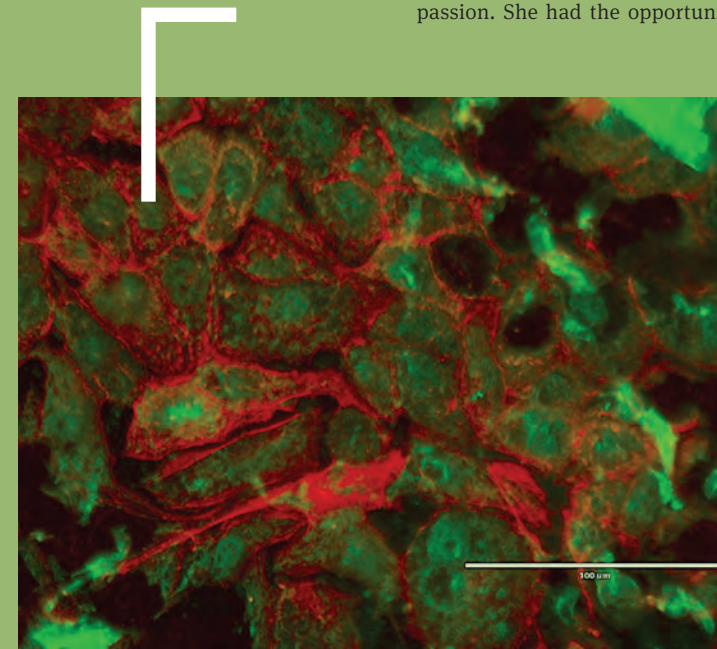
**Perla Ayala:** After completing her first year as a chemical engineering student at UCR, Dr. Perla Ayala started looking for opportunities where she could use her engineering training in health-related research. The field of Tissue Engineering and Biomaterials quickly became her passion. She had the opportunity to complete research internships at Cornell University and MIT and later completed a Ph.D. in Bioengineering through the UCSF/UC Berkeley joint program.

Dr. Ayala designed and developed miniature polymeric materials to improve cardiac function and reduce fibrosis after myocardial infarction during her doctoral training. She also completed a Postdoctoral fellowship in the Department of Surgery at Beth Israel Deaconess Medical Center and the Wyss Institute in Harvard where she developed stem cell laden engineered constructs for abdominal wall repair with enhanced tissue integration through enhanced vascularization. Dr. Ayala also became interested in helping to train and mentor the next generation of engineers/scientists that can contribute to solving the challenges of today and the future. "I am very honored to have the opportunity to contribute in both of these areas and to be able to integrate them in impactful ways here at CSULB," said Ayala.

When Dr. Ayala joined CSULB, she established the Therapeutic and Regenerative Systems Laboratory with a focus of developing precise models of disease that will help to investigate innovative treatments for patients suffering from heart disease and also of developing tissue engineered substitutes to facilitate tissue regeneration-particularly for applications on cardiac and skeletal muscle tissue regeneration. Her lab also investigates methods to improve robust vascularization during tissue repair and regeneration. Dr. Ayala's research projects and the students working on these projects have been supported by various funding opportunities awarded by: CSULB COE, CSULB ORED, CSULB UROP, CSULB BUILD, CSULB RISE, CSULB LSAMP, CSUPERB (New Investigator Award), NIH (SCORE grant), and more recently the NSF (CAREER Award).

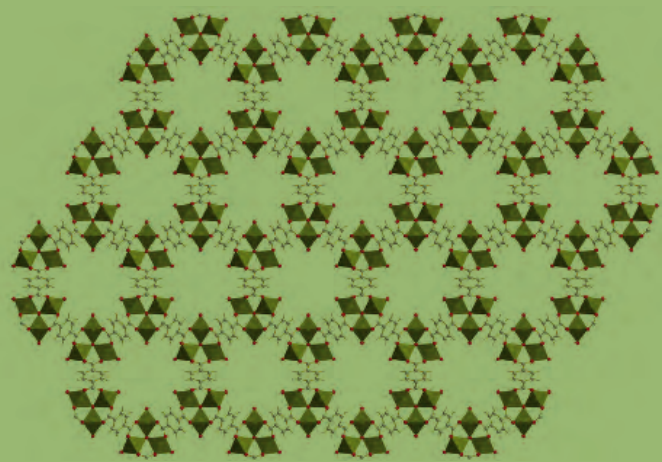
Student involvement is a key component to Dr. Ayala's lab. She states, "Graduate and undergraduate students' involvement in our projects is a key aspect in achieving the long-term goals of my lab. It has been a great honor to pursue these research goals with students at CSULB. Most of the students in my lab are undergraduate students. Over 45 students have worked on my lab in the past 5 years. I also work on integrating education, and research training as part of my lab goals and objectives. I enthusiastically support their professional goals, and many of the students that have worked in my lab have found rewarding positions in industry and in masters and Ph.D. programs. As a lab, we also develop hands-on workshops for middle and high school students to introduce engineering and the field of biomaterials and tissue engineering. I look forward to continuing advancing our research objectives while providing research training opportunities to our undergraduate and graduate students".

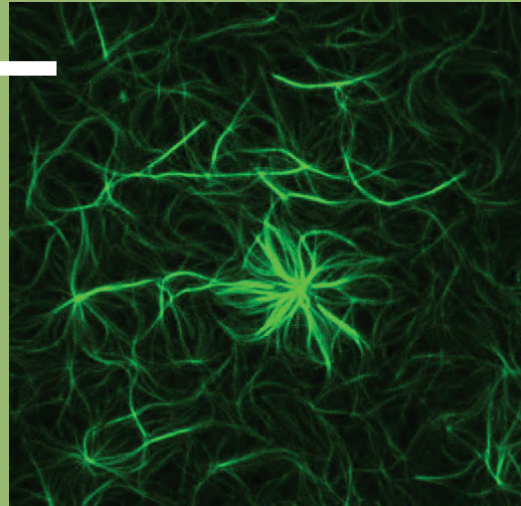
**Elena Grintsevich:** Dr. Elena Grintsevich's research aims to contribute to a molecular level understanding of neuronal biochemistry. "Neurons are very complex cells, and there



ABOVE: HL-1 Cardiac cells growing on a porcine derived collagen-based film.

LEFT: An illustration of a metal-organic framework structure





ABOVE: Actin-interacting factors can trigger formation of complex high order structures built from actin polymers.

are many fascinating domains of research related to them”, says Dr. Grintsevich. Her area of expertise is regulation of actin cytoskeleton, which is critical for shape and function of any eukaryotic cell. In neurons, the structures build from cytoskeletal protein called actin are involved in neuronal connectivity, signal transmission, and defining of the unique shape of neurons. Misregulation of actin cytoskeleton is linked to severe pathologies. One of the projects in Dr. Grintsevich’s lab (supported by the \$15,000 grant from California State University Program for Education and Research in Biotechnology CSUPERB) is focused on one of the actin regulators – drebrin A - which is only found in neurons and is largely affected in Alzheimer’s disease, epilepsy, and other human pathologies. Molecular level understanding of biochemical pathways involving drebrin will create a window of opportunity for its regulation in disease.

Another major area of Dr. Grintsevich’s research relates to regulation of actin cytoskeleton by site-specific oxidation/reduction (redox regulation). Although oxidation of biopolymers is generally perceived as a negative thing (oxidative stress), controlled oxidation and reduction is a part of proteins’ regulation in norm. However, these processes are not well understood and are an emerging domain of research. Essential cellular processes such as cell division and muscle/heart/neuronal development involve redox regulation, however molecular level understanding of it is limited. Dr. Grintsevich’s work on redox regulation of actin cytoskeleton was initially supported by a \$15,000 2021-ORED Multidisciplinary Research Grant (in collaboration with Prof. Editte Gharakhanian, Dept. of Biological Sciences) and now by a \$848,223 NSF CAREER award. ■

## Multiphase & Complex Fluids Flow Lab

Fluids... We are surrounded by them. Do you ever enjoy fluid flow’s intrinsic intricacy and beauty? You don’t need to travel far; simply glance around. From your morning coffee when you add milk into it and you see patterns of mixing inside your coffee to the contrails left in the sky chasing a jetliner. Dr. Ehsan Madadi’s fascination with fluid flow is

its “visual, fractal nature”. “A lot of the complexity we can see is due to the chaotic nature of turbulence. Fluids and gases can move in strange and mysterious ways that aren’t always apparent to our unaided eyes. The capacity to mimic real-world fluid flow using Computational Fluid Dynamics (CFD) in a simplified virtual physical arena is a gift of the current century”, says Madadi.

Dr. Madadi is the principal investigator for the Multiphase and Complex Fluids Flow Lab (MCF-FL) at CSULB. His group is working on developing numerical approaches for predicting and optimizing polydisperse multiphase flows relevant to energy and the environment. Dr. Madadi describes this as “a type of flow where one phase is composed by the discrete elements like bubbles, droplets, or particles inside another continuous phase like water or air”. Many processes to produce drugs, fuels, plastic materials, as well as energy from coal or biomasses, involve polydisperse multiphase flows. This type of flow is also naturally present in the environment. Examples are the formation of a mixture of air and solid particles due to volcanic eruptions and aerosol particles transported by the wind in metropolitan areas.

Investigating multiphase flows experimentally is challenging, and usually the cost of building equipment and running experiments are high and, in some cases it is difficult to perform optical

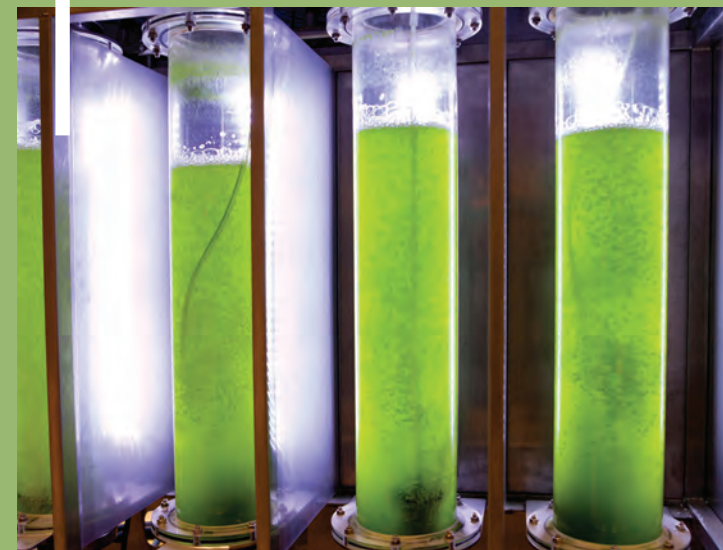
measurements. Experiments are hard to perform for extreme cases, for example in explosions, nuclear accidents, and contamination. Dr. Madadi’s group uses modeling as a complementary approach to experiments. Once validated and evaluated, computational fluid dynamic (CFD) modeling is used to create and optimize engineering applications by informing what experiments should be undertaken to cover the knowledge gap. Dr. Madadi’s research has been externally funded by

the California Space Grant Consortium (CaSGC) for workforce development through a grant by the University of California, San Diego.

Globally, the focus of Dr. Madadi’s research is in enabling the efficient simulation of complex physico-chemical processes involving polydisperse multiphase flows with acceptable computational time, tackling real-world industrial and environmental applications, and providing computational tools for decision makers to make the decisions fast enough and on the scale large enough to build a better future. Humanity is facing major global challenges including how to achieve sustainable development, combatting climate change, guaranteeing access to clean drinking water and sustainable sources of energy, and fighting new as well as re-emerging diseases.

On a local level, Los Angeles and Long Beach have recently been named first in the nation for most polluted ozone, fifth for year-round particle pollution, and

seventh for short-term particle pollution. Computational models built in Dr. Madadi’s research lab can help researchers understand particle and soot evolution and its transit in our society as well as suggest measures to minimize the negative impact on human health. ■



## Identifying & Addressing Unmet Mental Health Needs

Long before the COVID-19 pandemic, K-16 students had significant unmet mental health needs that impacted their ability to learn and required early intervention efforts and supports. Findings from the 2017-19 Biennial Statewide California Healthy Kids Survey found that one-third of secondary students experienced chronic sadness and 16% considered suicide. The suicide rate among Black youth in California has doubled since 2014 and is now twice the statewide average. In the 2020 California Children’s Report Card published weeks before the COVID-19 shut down, Children Now found mental health to be the number one reason children in California are hospitalized. Despite these alarming statistics, the state has historically paid little attention to policies that support student mental health services. In this same report, California received a “C-” grade for its limited programs providing health, education, and family services, and more to young people. California received an “F” for its high ratio of students-to-counselors, nurses, social workers, and psychologists in school.

The pandemic has brought unprecedented challenges and widened the already glaring disparities in the kinds of support and services that are provided in schools. Dr. Lopez-Perry, in collab-

### COLLEGE OF ENGINEERING

**Dr. Ehsan Madadi:**  
Assistant Professor

### COLLEGE OF EDUCATION

**Dr. Caroline Lopez-Perry:**  
Associate Professor



oration with the CSU Center to Close the Opportunity Gap, the California Association of School Counselors, and Southern California American Civil Liberties Union, captured two years of survey responses from over 1,200 students across 23 counties and 46 California school districts. The State of Student Mental Wellness report is the first to examine multiple years (2020-21) of student wellness data throughout the pandemic. Findings indicate 63 percent of students reported an emotional meltdown, 43 percent of students reported a panic or anxiety attack, 22 percent of students reported three or more days where they could not participate in school because of mental health, and 19 percent of students reported suicidal thoughts.

Roughly two out of three students (66%) reported their mental health was negatively impacted by the pandemic. The report also highlighted the need for increased access to school-based mental health supports. Over half of students reported the need for mental health services in both survey years, with over 22 percent of students desiring services for the first time each year. After more than a year of the pandemic and global shutdown, only 17 percent reported an increase in mental health services at their school while the overwhelming majority (83%) did not experience a change in access to services.

The quality of school-based mental health supports impacts student achievement resulting in vast inequities across the state. School counselors are typically the first school-based mental health providers to interact with students when they are struggling both mentally and academically and play a critical role in providing students with prevention and early intervention services. The California school counselor to student ratio is 572:1. While these ratios have been steadily improving, it is far from the 250:1 ratio recommended by the American School Counselor Association.

Dr. Lopez-Perry's research focuses on school counselor leadership, specifically the school counselors' role in addressing, coordinating, and leading mental health supports through program design, advocacy, and educational reform. "There is often a misconception about the role of school counselors. Perceptions of what a school counselor does is often based on the antiquated role of "guidance counselors" who focused primarily on vocational guidance," states Dr. Lopez-Perry. While the school counseling profession originated from guidance counselors in the early 1900's it has evolved since then. Today, the title "school counselors" is used to reflect school counselors' unique training in student academic, career, and social-emotional development. Dr. Lopez-Perry hopes "this work helps inform policymakers, county offices of education, and school districts on best practices around school-based mental health supports".

As mental health in K-16 schools becomes a growing concern, Dr. Lopez-Perry's scholarship has informed her teaching and has led her to develop two new courses, COUN 605: Mental Health and Crisis Response in Schools and COUN 690: Leadership and Coordination of School Based Mental Health Services that are being offered through the College of Professional & Continuing Education which focus on providing teachers, administrators, and pupil personnel services staff (school counselors, school psychologists, and school social workers) with the knowledge and skills to improve school-based mental health supports. ■

# FY 2022 FUNDING SUMMARY

*California State University, Long Beach serves the university community by creating a campus environment that is conducive to promoting research and other scholarly activities that contribute to the mission of the university.*

*With a primary emphasis on faculty-student research engagement, the Office of Research & Economic Development provides leadership, information, direction, resources, training and technical assistance to faculty and students engaged in externally funded research, instruction, community service and other scholarly activities.*

**280**

Proposals Submitted

**186**

Proposals Awarded

**\$104M**

Funds Requested

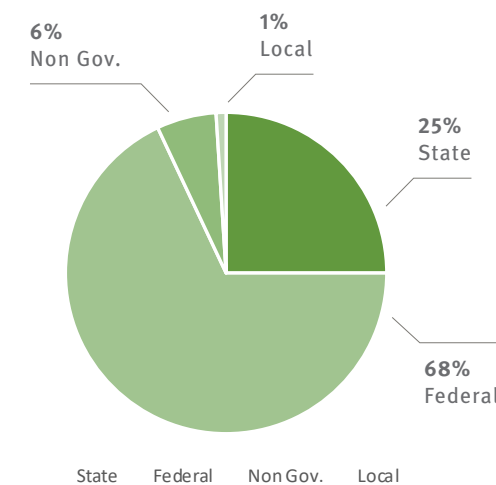
**\$66M**

Funds Awarded

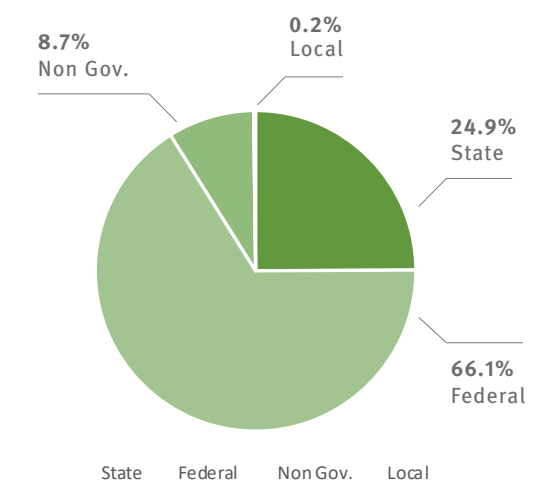
**\$34M**

Total Expenditures

## RESEARCH EXPENDITURES



## NEW AWARDS



# Quest

CALIFORNIA STATE UNIVERSITY  
**LONG BEACH**

Office of Research & Economic Development  
1250 Bellflower Boulevard, (MS-4509)  
Long Beach, CA 90840-4509

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Permit No. 301

*PHOTO: C2C12 Skeletal muscle myoblasts forming myotubes on an engineered collagen-based scaffold*

