

THE ECE CURRENT

Fall 2016

STUDENT SPOTLIGHT

UCSB Hyperloop Team

ALUMNI Q&A

Diego Rey, Founder of GeneWEAVE

A Letter From The Chair



I write this letter knowing that by the time the ECE newsletter reaches you, classes will have started and I will be welcoming new students and a few new faculty and staff members. However, at this time, my mind is still very much occupied with the events that took place this past academic year.

As you will see on the facing page, our colleague Professor Art Gossard received the National Medal of Technology and Innovation from President Obama at a ceremony held at the White House this last May. Art joined our faculty in 1987 and is widely recognized for his research at the interface between electrical engineering and materials sciences, most notably on the growth of semiconductor molecular layered materials.

For the first time this year, the Mechanical and Electrical and Computer Engineering Departments joined forces in organizing a year-end celebration event to showcase the creativity and hard work of our students in developing their Senior Capstone Projects. A select panel of judges, which included both faculty and industry leaders, were tasked with awarding and recognizing those students whose projects represented engineering excellence. The Hyperloop Team featured in this issue of "The ECE Current" received the Best Technical Presentation Award. The event, attended by over 300 guests from both community and industry, was a tremendous success and we are looking forward to building on this year's success to make next year's Capstone Showcase even better.

Another topic that is very much on my mind are the many improvements that we have made to the academic, scientific, and social environment in our department. We have renewed aging equipment in several of our instructional laboratories and have made some of these labs more comfortable as well as aesthetically pleasing. We have also started a weekly coffee hour to bring together our graduate students in order to foster a stronger sense of community. Many of these efforts were supported by gifts from alumni and friends of our department. We are very thankful for this.

João Pedro Hespanha

João Pedro Hespanha
ECE Department Chair



2016 National Medal of Technology and Innovation **Professor Arthur Gossard**

Arthur Gossard, a research professor and professor emeritus of Electrical and Computer Engineering and Materials at UC Santa Barbara, was among eight recipients to receive the National Medal of Technology and Innovation, the nation's highest honor in science and technology. Professor Gossard was awarded the medal for his contribution to the "innovation, development, and application of artificially structured quantum materials critical to ultrahigh performance semiconductor device technology used in today's digital infrastructure." Gossard's research has resulted in technology companies' ability to create microscopic layers of matter only a few atoms thick, resulting in a faster flow of electrons which enables devices from mobile phones to solar panels to be more energy efficient.



Photo courtesy of UCSB Hyperloop

STUDENT SPOTLIGHT

UCSB HYPERLOOP

Faculty Advisors: Dr. Ilan Ben-Yaacov (EE), Dr. John Johnson (CE) & Dr. Tyler Susko (ME)

Imagine being able to travel from Los Angeles to San Francisco in under 30 minutes! That was the vision laid out in 2013 by SpaceX CEO Elon Musk when he released a proposal for Hyperloop, the fifth major mode of transportation. The Hyperloop transportation system consists of a partially evacuated tube connecting major destinations that are 300-600 miles apart. Levitating pods carrying travelers would be shot through the tube, reaching speeds in excess of 700 miles per hour. Riders would then be able to travel between major cities such as Los Angeles and San Francisco in extremely short times and at a high level of comfort, avoiding the traffic and air delays that we've become so accustomed to.

In the summer of 2015, SpaceX announced a Hyperloop Pod Car competition, intended to accelerate development of the Hyperloop system. SpaceX is building a 1-mile test tube at their facilities in Hawthorne, California, and competing engineering

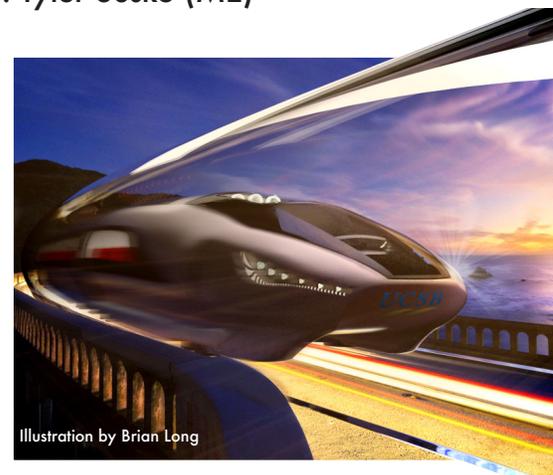


Illustration by Brian Long

THE ECE CURRENT



teams will build pods and race them through the tube in Winter and Summer 2017.

UCSB Hyperloop is out to make this dream a reality. The interdisciplinary team of over 20 students are working with a group of professors and industry professionals and are being further guided and mentored by two long-time SpaceX engineers. After presenting their pod design at the SpaceX Hyperloop Pod Design Weekend in January 2016 at Texas A&M University, they were one of 30 teams (from over 1,200 initial entries) that were selected by SpaceX to compete in the finals of their competition. The team has been designing and building their pod since September of 2015. As of June 2016, they have completed construction of all subsystems and are integrating them into a final build so that they can begin levitation testing, as well as programming and testing of the pod's control systems.

The completed pod is expected to weigh about 500 pounds, will have a fiberglass outer shell, and a support system built from steel and aluminum. A set of six magnetic levitation engines powered by lithium polymer batteries and rotating at over 2000 RPM will allow the pod to levitate 6mm above the aluminum base of the tube as the pod travels through the tube at speeds over 200 miles per hour. A magnetic braking array will slow the pod from high speeds to about 60 miles per hour, after which mechanical brakes will engage to bring the pod to a complete stop. The team's pod further includes an array of sensors, including 3-axis accelerometers, gyroscopes, and short- and long-range position sensors, in order to measure and record the levitation height, position, and many other parameters as the pod travels through the tube. The pod's entire control system and telemetry unit is controlled by a 4-layer circuit board powered by a pair of NXP 4088 microprocessors, which the team designed and fabricated.

The UCSB Hyperloop Team is also concurrently working with the Wolf Museum of Exploration and Innovation (MOXI Museum), which will soon open in Santa Barbara to create an exhibit about the Hyperloop transportation system and the pod that they are building.

Work on this project has been made possible by generous support from Jonathan and Christina Siegel, Steve and Anita Holmgren and the following industry Partners: Raytheon, Northrup Grumman, Tenon Intersystems, Ingersoll Rand, Tattu, UCSB Edison-McNair Scholars Program, California Chamber of Commerce and UCSB Associated Students.

20+ interdisciplinary students are working together

500 pounds of fiberglass, steel, and aluminum

200 miles per hour, the fastest any team is attempting

30 minutes to get from Los Angeles to San Francisco

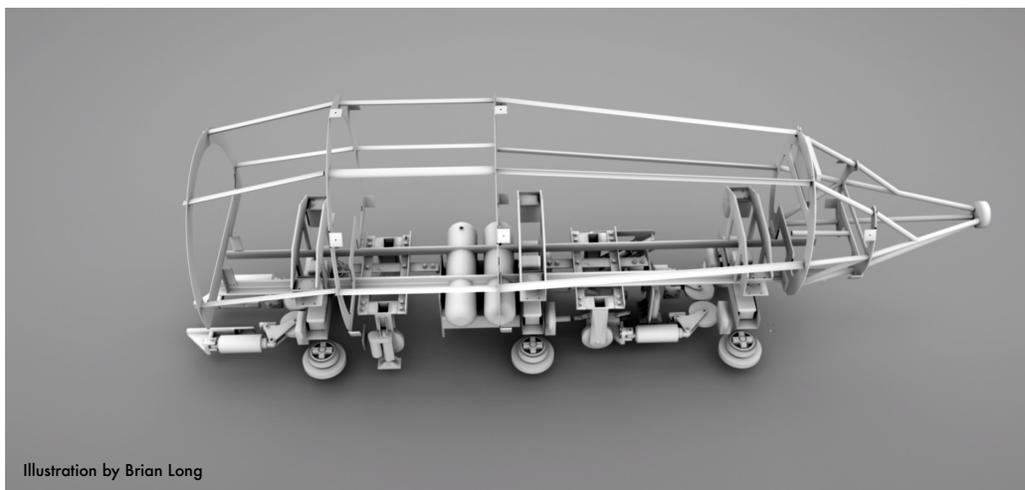


Illustration by Brian Long

Q&A DIEGO REY

Diego Rey received his BS in ECE from UCSB in 2008. He is the founder of GeneWEAVE, a company that is taking on drug-resistant bacteria – modern medicine’s biggest challenge. They use novel Smarticles™ technology to build solutions that give healthcare providers around the world the tools they need to guide treatment and keep patients safe from the threat of bacterial infections.

WHERE IS YOUR HOMETOWN?

I was born in Argentina and my family moved here in 1989 from Bariloche, in Patagonia. I went to high school in Palo Alto. From there I went to UCSB to major in electrical engineering and later I joined the biomedical engineering program at Cornell University.

WHY DID YOU CHOOSE UCSB?

I wanted to stay in California, but what made UCSB special was the unique experience I had when I came to visit. A family friend whose son was at UCSB and a member of the engineering student group Los Ingenieros personally showed me around. I felt like I could come into a community of friends if I chose UCSB, and that’s exactly what happened.

WHAT WERE SOME OF THE STRENGTHS OF THE UCSB ENGINEERING PROGRAM?

I knew I wanted to do engineering, but I wasn’t quite sure what discipline. I decided on electrical engineering. It seemed like the most versatile to me and UCSB has a great Electrical Engineering program just by reputation.

TELL US ABOUT YOUR ACHIEVEMENTS SINCE YOUR TIME AT UCSB.

After graduation from UCSB, I entered the biomedical engineering program at Cornell as an electrical engineer with no coursework in biology. My first two years of grad school

were basically a self-imposed boot camp just to catch up on the biology that I really should have known going into the program. Starting from scratch was a great achievement. Since graduate school my life has been defined by starting a company – GeneWEAVE. We had our ups and downs – growing from 2 to 50 people from the time the company was acquired. Building those teams, building the product, getting investment into the company. If you're going to start a company, you have to make it your entire life.

WHAT MOTIVATED YOUR ENTREPRENEURIAL SUCCESS?

You never really know what will happen as an entrepreneur. It involves lots of risk. That can be a good thing because you don't see all the daunting hurdles in front of you and can blindly push forward. You have to balance that with learning along the way, bringing in the right people, mentors, employees, and everything else too. I think the most important thing that helped us along the way, which is essential in most startups, is the company culture. GeneWEAVE and the acquiring company Roche had similar cultures; that was actually a big part of the decision to move forward.

TELL US ABOUT YOUR COMPANY AND HOW IT'S MAKING AN IMPACT ON THE WORLD.

GeneWEAVE develops tests for detecting and identifying bacteria and then determining which drugs will kill those bacteria. There is a big problem with MDROs, multi-drug resistant organisms. We are running out of options for antibiotics, which is very dangerous because without them we can't do things like surgery. Our goal is to make a more simple, very cost effective tool for hospitals to detect and identify bacteria and figure out which drugs will work in a much shorter time frame – a matter of hours, instead of days.

DO YOU HAVE ANY ADVICE FOR STUDENTS AT UCSB?

Work hard. It's easy to do in Santa Barbara because you can celebrate your hard work and enjoy a great campus like this. The UCSB Engineering program is really tough, very rigorous. But it really all begins when you leave UCSB. When I was a UCSB student, what helped me get into Cornell was their summer research program for undergrads. I did that for two summers. If you'd like to go to grad school, getting research experience as an undergrad is absolutely critical.

YOU'RE SPONSORING CAPSTONE PROJECTS THIS YEAR. WHY DO YOU THINK MENTORSHIP IS IMPORTANT?

Roche is sponsoring a team that is working on GeneWEAVE technology – actually making a cheaper, smaller version of the light detector we currently use. A part of doing the capstone project, as a company, was trying to build something that will be of value. For me personally, mentorship has been especially important in the entrepreneurial community. The only way to learn is to hear from someone that has been there before – this is an important component to the entrepreneurial eco-system.

WHAT MOTIVATES YOU TO INVEST IN YOUR ALMA MATER?

I had the best experience here at UCSB. The memories here are amazing – full of hard work and a ton of great friends. In particular, giving back to the group Los Ingenieros. What they do for members and for the community as a whole is phenomenal. A lot of them are engineers working hard, doing everything they can to graduate, and on top of that they're doing tons of outreach activities.

LOS INGENIEROS HAS MADE A BIG IMPACT ON YOUR LIFE. DO YOU STILL KEEP IN TOUCH?

The way Los Ingenieros works is, if you join before freshman year they allow you to do some coursework

before you actually start the engineering program. It's kind of like a boot camp and a lot of the existing members act as mentors to the incoming freshman. Students hit the ground running. It's enough that you're joining this rigorous academic program, leaving home, going from high school to college – it's a lot of change. By doing coursework up front, you can focus on integrating into the community, making friends, and staying on top of school. I've formed great connections and friendships and I've got Los Ingenieros friends all over the world.

ONE LAST QUESTION: WHY HAVE YOU BEEN DUBBED THE SKATEBOARDING SCIENTIST?

Everyone skateboards in Santa Barbara! So I would say, anyone that does anything science related and goes to UCSB is a skateboarding scientist. Once you're outside of Santa Barbara, it's different. Like at Cornell, you're on a hill – you can skateboard one way, but not the other.

**FOR AN EXTENDED VIDEO INTERVIEW, PLEASE VISIT
ECE.UCSB.EDU/PROFILES/DIEGO-REY**

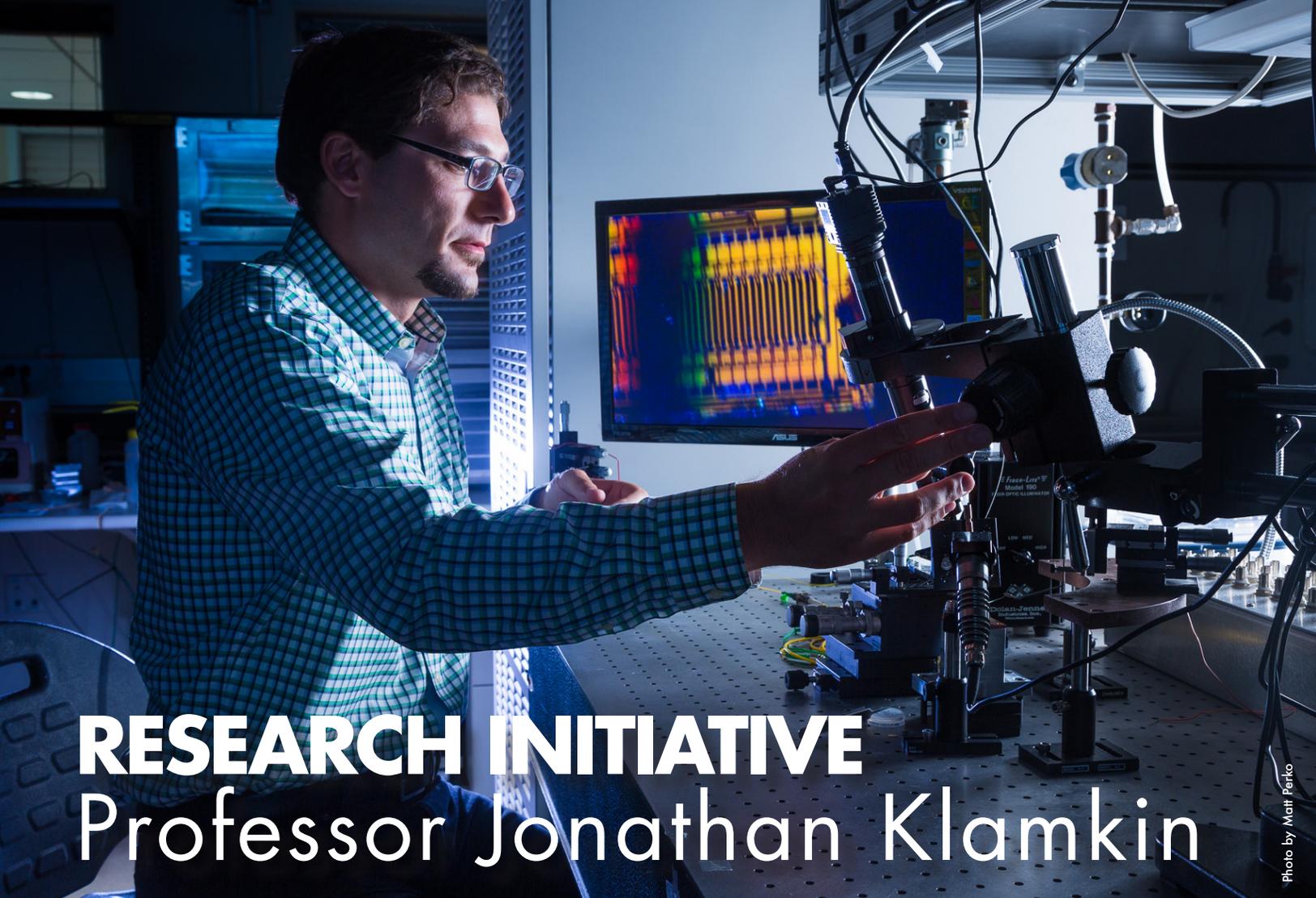


Photo by Matt Perito

RESEARCH INITIATIVE

Professor Jonathan Klamkin

FREE SPACE LASER COMMUNICATIONS

Undersea and ground-based fiber optic links have allowed humans to exchange knowledge at unprecedented volumes, changing the way we live and communicate. What if we could extend this capability to remote locations around the globe? Or stream high-definition video from satellites throughout our solar system? Optical line-of-sight links could transmit data up to 100 times faster than state-of-the-art satellite radio frequency technology, enabling high speed internet in outer space. The first Earth-to-satellite demonstrations of free space laser communications, or “lasercomm”, were completed in the ‘90s, but it was not until the ubiquity of the Internet that optical components became sufficiently inexpensive and reliable to make lasercomm a viable complement to legacy radio frequency systems.

LASERCOMM APPLICATIONS

In 2013, NASA’s Goddard Space Flight Center, in collaboration with MIT Lincoln Laboratory, made the longest distance lasercomm transmission yet using the Lunar Laser Communications Demonstration (LLCD) module aboard the Lunar Atmosphere Dust and Environment Explorer (LADEE). Over three months, the LLCD sent data over the more than 239,000 miles between the Moon and Earth with a record download speed of 622 Mbps. For comparison, the best data rate ever achieved with a lunar radio frequency transmitter is 100 Mbps.

Also in 2013, Facebook and Google both announced initiatives to provide global Internet connectivity by servicing remote and poverty stricken areas of the world that can’t afford terrestrial infrastructure. Both companies plan to deploy a backbone of mobile nodes that will communicate with each other via free space optical links within the stratosphere. Google’s plan, facetiously dubbed Project Loon, employs a multitude of helium filled balloons guided by the multidirectional layers of wind current in the stratosphere. Project Loon has had successful local tests in New Zealand, Brazil, and California. Meanwhile, Facebook intends to establish a fleet of drones flying at an altitude of over 12 miles as the intercommunicating backbone of its system. The first drone, Aquila, which has a wingspan greater than 90 feet while weighing less than 1,000 pounds, will have a test flight in the near future.



Looking ahead, NASA will launch its first optically linked satellite network, the Laser Relay Communications Demonstration (LCRD), in 2020. Following in the footsteps of the LLCD, the initial LCRD demonstration will span two years, testing the network's longevity and robustness through various atmospheric conditions. Programs such as this are establishing the infrastructure needed for the next era of space exploration.

INTEGRATED PHOTONICS FOR LASERCOMM

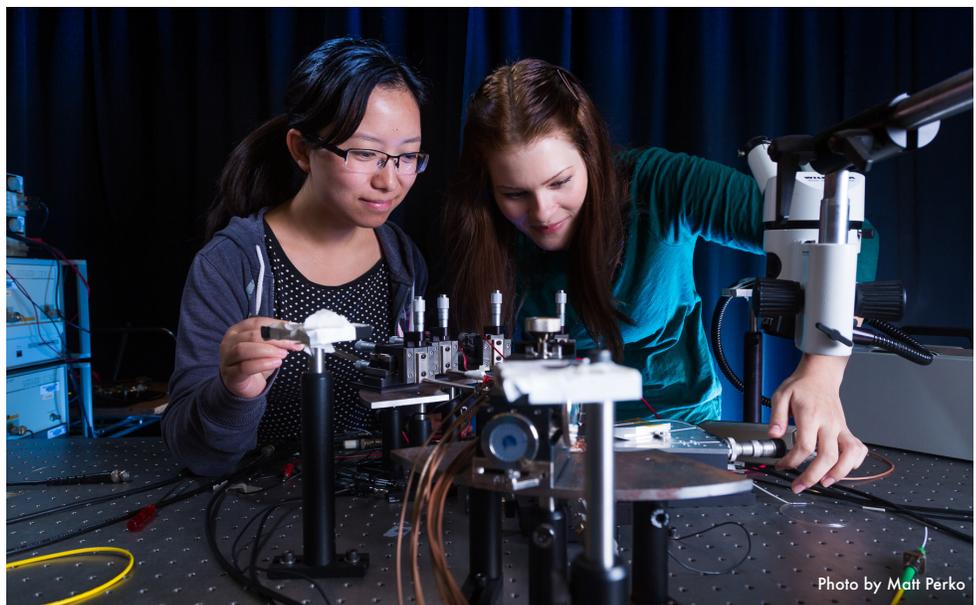
The LCRD program will also include the first test of a space-based photonic integrated circuit (PIC) transceiver aboard the International Space Station. In contrast to an assembly of individually packaged devices connected by optical fiber, a PIC includes all of the functional components such as lasers, splitters, and modulators on a single chip, similar to an electronic integrated circuit. Integrated photonics is an ideal technology for spaceborne applications due to the low size, weight, and power (SWaP) of a PIC. In addition, integration eliminates most fiber connections, which often leak half of the optical power at each interface. Finally, a single solid PIC has far fewer failure points than a system of carefully aligned components, making it more durable and reliable, especially after the mechanical rigors of launch.

UCSB is one of the first to design and develop PICs specifically for satellite laser communications.

INTEGRATED PHOTONICS LABORATORY

Although a PIC may be the best technology for the job, very little photonic integration development has been carried out for free space communications. Under the direction of Professor Klamkin, the Integrated Photonics Laboratory (iPL) at UCSB is one of the first to design and develop PICs specifically for satellite laser communications. The work kicked off in 2014 when Professor Klamkin received the NASA Early Career Faculty Space Technology Research Grant for his proposal, HELIOS: Heterogeneous Laser Transmitter Integration for Low SWaP. Professor Klamkin is also the recipient of a 2015 NASA Early

Stage Innovations grant to develop PICs for ultra-low SWaP. Professor Klamkin's group is addressing problems unique to lasercomm, with graduate student Victoria Rosborough spearheading the project and contributions coming from other iPL members including Bowen Song, Hongwei Zhao, Fabrizio Gambini, and Sarvagya Dwivedi. The efforts are also assisted by collaborations with NASA's Goddard Space Flight Center, Jet Propulsion Laboratory, and MIT Lincoln Laboratory. The main design challenges include building PICs with adaptive transmission formats to address chaotic atmospheric conditions and generating high peak optical power output to overcome the significant free space diffraction losses accrued over large distances.



NEW FACULTY SPOTLIGHT

Yon Visell joined the ECE Department as an Assistant Professor in Fall 2015. He received a BA in physics with Honors from Wesleyan University, a MA in physics from the University of Texas at Austin, and a PhD in Electrical and Computer Engineering from McGill University.

Before joining UCSB, he spent more than five years in industrial R&D as a DSP developer at Ableton, a leading music technology firm, and research scientist at Vocal Point (now Nuance) working on automatic speech recognition. From 2012 to 2015 he was a faculty member in the ECE Department at Drexel University. His research interests are in haptics, wearable technologies, and soft robotics. Yon is also an artist whose interactive artworks have exhibited at preeminent international venues.

RE-ENGINEERING THE SENSE OF TOUCH

Engineers have long sought to design technologies that can mirror the remarkable prehensile, sensory, and manipulation abilities of biological systems for touch, most notably, the human hand. Examples of such systems include skin-like tactile sensors, or wearable technologies for allowing us to touch and feel objects in virtual reality that do not have any physical existence. The difficulties encountered in the engineering of such technologies have catalyzed research on the science and engineering of the sense of touch – an interdisciplinary field that is today known as haptics, and that scarcely existed just a few decades ago.

TACTILE SENSING IN ROBOTICS

As robotic systems are employed in more and more diverse roles, it has become increasingly clear that touch sensing will be indispensable if these systems are to usefully operate, and to interact, within real-world environments. For evidence of this, we need only look to the biological world, where touch sensing is involved in activities of all animals, and fundamental to those that are closely linked to survival: from locomotion to foraging and tool use. The impossibility of completing such tasks should be familiar to anyone who has dismissed the idea of eating after a visit to the dentist that included local anesthesia, or of walking on a foot that has gone numb. This close interplay between movement and touch sensing is a distinctive hallmark of the haptic modality, and contributes greatly to the difficulty of designing engineering analogs of touch sensory systems, because the signals they produce depend greatly on what we touch and how we touch.

MAKING VIRTUAL REALITY EXPERIENCES 'PALPABLE'

Interest in haptics also arises from the field of virtual reality, in which it is possible, today, to realize immersive three-dimensional environments that are highly evocative, appearing almost real to the eye and ear. However, current virtual reality simulations create experiences that can be described as distant and insubstantial, because they do not allow us to touch or feel the objects that they contain. Devices that could enable us to do so would achieve similar functionality for the hand that as a video display accomplishes for the eye – lending us perceptually realistic experiences of viewing three – dimensional objects that are not physically present. Video displays achieve this by modulating

arrays of light sources (pixels) that emit just three wavelengths. In contrast, touch relies on mechanical and thermal signals, rather than light, and current technologies for reproducing these signals, i.e. haptic display technologies, remain comparatively extremely limited. The difficulties involved can be traced to the diversity of touch elicited signals, which span a wide range of length and time scales (from micrometer to meter scale, and milliseconds to seconds); to the high dimensionality and complex dynamics governing these signals; and to the heterogeneous array of many thousands of tactile sensory cells that are involved, each capturing distinct aspects of these signals and transmitting them to the brain. Another challenge involved is that as noted above what we feel depends sensitively on how we feel. These factors, in turn, have limited our understanding of how touch-related signals encode properties of touched objects, and to how these properties can be extracted from mechanical signals that are captured during active touch sensing.

SOFT ELECTRONICS INSPIRED BY THE SKIN

In order to address these challenges, Dr. Visell's group is designing new technologies, including wearable sensors and displays, that are matched to the sense of touchdrawing on methods from engineering, computer science, and neuroscience. Because touch experiences involve dynamically varying contact interactions with our skin, a soft layer that deforms with movements of our body, the group is working at the interface of electrical engineering and smart materials systems in order to design new sensing and actuating materials that can accurately reflect touch interactions between the body and touched objects.

PROFESSOR YON VISELL

In recent research, Dr. Visell's lab has created thin, skin-like tactile sensors that can be worn on the body. The devices consist of arrays of capacitive elements formed from liquid metal (Galn) electrodes that are integrated in microchannels embedded within thin, highly compliant membranes. By tailoring the microgeometry of these soft mechanical sensors, it is possible to realize devices that achieve high sensitivity and millimeter-scale spatial resolution, approaching the capabilities of human skin.

TOUCH AS WAVES

In another area of recent work in Dr. Visell's group, they are contributing to a new view

of touch signals as mechanical waves traveling in the skin. The group has used custom wearable sensor arrays, including a MEMS accelerometer network worn on the hand, together with computational imaging algorithms, in order to capture and reconstruct transient waves in the skin that are elicited through touch contact. Dr. Visell's group has demonstrated that when at the moment we touch an object, these tactile waves are excited in the skin, and that they propagate rapidly and broadly to other areas of the hand and arm, and then dissipating within tens of milliseconds. The group demonstrated that the spatial pattern of propagation of these waves accurately

reflects the manner in which an object is touched, what the object is made of, and the parts of the hand that are involved. Dr. Visell's group is using the results to guide the design of new wearable technologies, including soft material actuators, that can synthesize waves in the skin that resemble those that are elicited by touch contact. Using these devices, they aim to enable people wearing new electronic interfaces to touch, feel, and interact with virtual objects that are not physically present.





FACULTY MENTORSHIP

Yuan Xie



WHAT DOES MENTORING MEAN TO YOU, AND WHY IS IT IMPORTANT IN YOUR PROFESSION?

Mentorship is a relationship in which a more experienced or more knowledgeable person helps to guide a less experienced or less knowledgeable person. A great professor not only produces great research papers, but also mentors and graduates great

students. Students are a professor's legacy! It is important for me as a professor because a mentor plays an important part in improving someone's life, helps them gain confidence, helps them grow intellectually and personally, helps them develop skills such as how to do research, how to write papers, give presentations, and how to network. All of which helps them to have a successful career. It is a worthwhile and rewarding endeavor and also a lifelong learning experience for me.

AS A STUDENT, DID YOU HAVE A FACULTY MENTOR?

Yes, when I was an undergraduate student at Tsinghua University, China, Professor Hui Wang was my mentor; when I was a graduate student at Princeton University, both Professor Marilyn Wolf and Professor Niraj Jha were my mentors. My first job after I graduated with a PhD, was with the IBM Microelectronics division. I also had a great mentor there, Mr. Kerry Bernstein. Later, when I started as a young professor at Penn State, Professor Mary Jane Irwin was my great mentor. I am extremely lucky to have had many mentors during different stages of my career path.

WHICH ASPECTS OF AN ACADEMIC CAREER DO YOU FIND MOST REWARDING?

I think the most rewarding aspect is to see the growth of students that I trained and mentored, and eventually see that they have a successful career, some in industry, others in academia. Some of them even have graduated their own students who are my "academic grandchildren."

HOW HAVE YOUR SCIENTIFIC ACCOMPLISHMENTS BEEN SHAPED BY HAVING A CADRE OF STUDENTS AROUND?

Students are my colleagues; they work together with me on various research projects. The scientific accomplishments are the outcomes of our work together.

WHAT DO YOU HOPE YOUR STUDENTS TAKE AWAY FROM THEIR TIME IN YOUR LAB?

I hope that my students can master the essential skill set for their future career path, either in industry or in academia. They should have strong communication skills such as written/oral presentation/networking. They should know how to independently identify problems and find solutions to solve problems. After they graduate from my lab, they should be able to become the leader/expert in whatever career path they choose.

HOW DO YOU MEASURE SUCCESS AS A TEACHER?

I think the success of a teacher is measured by the success of his/her students. I feel successful when the students I mentor become a successful professor in a university, or a successful engineer/researcher in industry. I have graduated 23 PhD students (including co-advisees) and many of them are doing very well in industry or academia. Also I am very proud that out of the 23 PhD students I graduated, eight of them are women PhD students, and four of them joined academia and became professors in the U.S., China, Taiwan, and Hong Kong. As David Patterson from UC Berkeley said eventually, students are your legacy.



DO YOU KEEP IN TOUCH WITH ANY OF YOUR FORMER STUDENTS?

Yes, I keep close relationships with my former students. For example, I have a WeChat group that includes more than 30 former students (including MS and REU students). Many of my students work in the Bay Area and when I visit, we always try to have a reunion.

WHAT IS THE GREATEST THING A STUDENT HAS EVER TAUGHT YOU?

The process of mentoring has taught me many things. One thing I realize is that I should never underestimate students' potential and should always encourage them to be the best of themselves.

FACULTY AWARDS & HONORS



JOHN BOWERS

National Academy of Inventors (NAI) 2015

Election to NAI Fellow status is a high professional distinction accorded to academic inventors who have demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society.



ALBERTO Busetto

Big Data Chair of the Japan-America Frontiers of Engineering Symposium 2016

The Japan-America Frontiers of Engineering aims to bring together the most promising early career engineers from Japan and the U.S. to facilitate international and cross-disciplinary research collaborations.



STEVE DENBAARS

Central Coast Innovation Award 2016

Materials & ECE Professor Steven DenBaars is among UCSB's notable entrepreneurs and tech pioneers and was recognized at the 2016 Central Coast Innovation Awards.



JOHN JOHNSON

UCSB College of Engineering Outstanding Faculty Award, 2016

Instructor John Johnson was selected as "Outstanding Faculty Member" for 2016 by Computer Engineering graduating senior students. The award is coordinated by the Engineering Student Council and is given out yearly to a faculty member in each major in the College of Engineering.



JONATHAN KLAMKIN

NASA Early Innovation (ESI) Award 2015

Professor Klamkin's proposal "PICULS: Photonic Integrated Circuits for Ultra-Low Size, Weight and Power" was one of 15 university-led proposals selected by NASA for the study of innovative, early stage technologies that address high priority needs of America's space program.



HUA LEE

UCSB College of Engineering Outstanding Faculty Award, 2016

Professor Hua Lee was selected as "Outstanding Faculty Member" for 2016 by Electrical Engineering graduating senior students. The award is coordinated by the Engineering Student Council and is given out yearly to a faculty member in each major in the College of Engineering.



UMESH MISHRA

National Academy of Inventors (NAI) 2015

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CLINT SCHOW

The Optical Society of America (OSA) Fellow 2016

OSA Fellows are selected based on their overall impact on optics, as gauged through factors such as specific scientific, engineering, and technological contributions, a record of significant publications or patents related to optics, technical leadership in the field, business leadership, and service to OSA and the global optics community.

ROGER WOOD AWARD WINNERS

In recognition of their strong academic records and exceptional commitment toward their education at UCSB, the 2015-16 Roger Wood Award was presented to:

Brian Martin Sandler (CE)
Brian Alexander Canty (EE)

THE HERBERT KROEMER FELLOWSHIP

Funded by Henry Chien in honor of Professor Herbert Kroemer to support a dissertation fellowship enabling PhD students to devote their full attention towards research in the final period of their PhD, the 2015-16 fellowship was awarded to:

Chong Zhang (ECE)

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Invest in the Department of Electrical and Computer Engineering

The goal of the Department of Electrical and Computer Engineering at UC Santa Barbara has always been to provide our students with the best possible opportunities to learn and develop. The faculty, students, and administration have created an atmosphere of interdisciplinary and collaborative research that is renowned throughout the Nation and is the cornerstone of our success.

Your investment in the Department of Electrical and Computer Engineering plays a critical role in our ability to fulfill our mission and provides essential support of ECE's teaching program and research enterprise.

Department funding opportunities include:

- **Unrestricted support** to be allocated to the highest priority needs of the Department.
- **Roger Wood Endowment**, established in honor of esteemed faculty member Roger C. Wood, supports undergraduate and graduate fellowships, faculty, and state-of-the-art teaching facilities.
- **Undergraduate laboratory** renovations to maintain and upgrade the quality of essential facilities for teaching and research. Priority renovations and naming opportunities include: Digital Lab, Controls Lab, Computer Engineering Lab, High Speed Communications Lab, Microwave Lab, Digital Signal Processing Lab, and the Instructional Clean Room.
- **Endowed chair establishment**, which honors, encourages, and supports the professors whose brilliant minds and commitment to education and research promote the University's mission.
- **Petar V. Kokotovic Distinguished Visiting Professorship**, established by Dr. Kokotovic's former students and colleagues as a vehicle for honoring and recognizing his contributions to UCSB students, the UCSB campus, and the academic community. The fund supports an annual named distinguished visiting professorship.



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2016 CAPSTONE WINNERS

**SENIOR ELECTRICAL ENGINEERING
PROJECT
(ECE 188)**

Most Innovative: FLIR Flashlight

EE Team (multidisciplinary w/ CE & ME):
Lorena Covarrubias, Zachary Schmidt,
Vishaal Varahamurthy, Anna Wu

Best Technical: UCSB Hyperloop

EE Team (multidisciplinary w/ CE & ME):
Mary Alice Callaghan, Juan Castillo, Elena
Georgieva, Christopher Johnson, Terrence
Tran

Faculty Choice Award: SONOS Bulb

EE Team (multidisciplinary w/ CE & ME):
Nicholas Bottomley, Zhengshuang Ren,
Zhanming Zhang

**COMPUTER ENGINEERING SENIOR
COMPUTER SYSTEMS PROJECT
(ECE 189)**

Best Project: Soil Smart

Team: Jacob Adams, James Cornell, Jesus
Vega, Peter Marcelo, Ricardo Morones

This image features components of the SONOS Bulb.