



focus on:

Entrepreneurship

With more than 100 businesses launched to date, which have generated more than \$10 billion in shareholder value, UC Santa Barbara is in the midst of a startup storm that has helped to transform the Santa Barbara-Goleta area into a center of tech-based economic growth. In this special section, we take a look inside this thriving entrepreneurial landscape.

The Evolution of Entrepreneurship

Thirty years ago, UCSB inventors had no clear path for taking ideas to the marketplace. Now they do. Here's how it happened.

There is no definitive starting point for entrepreneurship at UC Santa Barbara, no place or time that can be identified as “the beginning.” It simply occurred and then, over time, evolved, much in the manner of a startup. “Entrepreneurship at UCSB is really an organic story,” says **Bob York**, a professor in the College of Engineering’s (CoE’s) Electrical and Computer Engineering Department and currently dean of Professional and Continuing Education at UCSB, who was a key architect of the Technology Management Program (TMP), now home to programmatic support for entrepreneurship.

Entrepreneurial activity was occurring at UCSB at least as early as the 1960s, when mathematician and electrical engineering professor **Glen Culler** played a key role in the university’s becoming one of the four original nodes of the ARPANET, the technological precursor to the Internet.

Tim Schwartz, formerly assistant dean for development at the UCSB College of Engineering (CoE) and executive director of the entrepreneurship program, and now UCSB Senior Director of Development, says that while planning an event honoring Culler in 1996, he learned about nearly a dozen startups launched by the professor’s graduate students and one by Culler himself.

In the early 1990s, UCSB’s former dean of engineering, **Venky Narayanamurti** (known as “Dean Venky”), was deeply engaged with the CoE’s Advisory Committee, made up of local technology CEOs, around the shifting Santa Barbara economic landscape. The community was experiencing a major recession, including a significant decline in the once-robust local defense industry. The Advisory Committee was looking to the College of Engineering to consider its role in training students both to create and fill high-wage, clean tech jobs. Venky was particularly drawn to the course in entrepreneurship his fellow Bell Labs transplant **Professor John Bowers** had started in 1992, partly in response to the same economic scenario the Advisory Committee was considering.

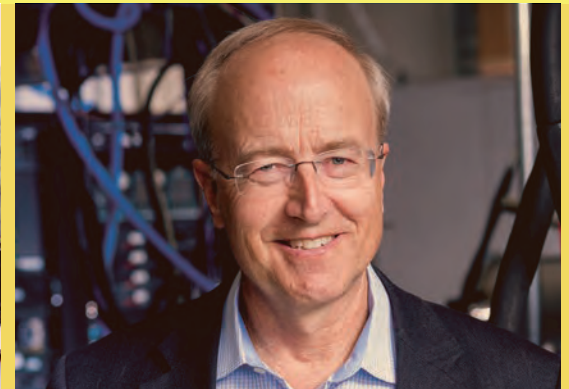
Another reason was that Bowers saw a lot of talented scientists being laid off during the recession. “Around 1992 I started wanting to talk about how you do innovative research to generate new products and make companies successful,” he says. “I thought that it is important to write not just an incredibly good paper, but also

an incredibly good patent. That’s what can help a company become commercially successful.”

Eventually, Bowers merged his class with a similar one taught by economics professors **Samantha Carrington Crouch**, **Robert Deacon**, and **Jon Sonstelle**. It was called Economics of Entrepreneurship and Entrepreneurial Engineering, and Bowers



Bob York



John Bowers

remembers it as “the largest class I ever taught. Enrollment was capped at one hundred fifty students, and it was full every time.”

Bowers was also having regular lunch meetings with a group of student entrepreneurs from his course at the time, among them then-master’s student **Olivier Jerphagnon** (MS ’99), now CEO of the startup he founded, PowWow Energy. One day during spring 1998, Jerphagnon and three of his fellow students met with Dean Venky and handed him a three-page proposal they had written for a program in entrepreneurship. The dean, Jerphagnon recalls, “took a quick look at it, got up, and left the room.” He came back a few minutes later, carrying a different sheaf of papers. It was another outline for an entrepreneurship program, but it had been written about a week before by Schwartz, largely at the behest of the Engineering Advisory Committee.

“The driver for us was how to give undergraduates opportunities to get better jobs locally and to give graduates more opportunities to start companies from their inventions,” Jerphagnon recalls.

The two briefs were nearly identical, and Venky joked that Schwartz needed to convince him that he had not helped the students write their proposal. The dean, who was fond of saying, “Entrepreneurship is a contact sport,” acted decisively. If two separate groups had come up with nearly identical plans at the same time, and the community was looking to the college to grow its role in fostering economic development, he reasoned, it must be an idea whose time had come. Soon thereafter, the Center for Entrepreneurship and Engineering Management (CEEM) was born.

CEEM was a startup of sorts in its own right, depending almost

Apeel Sciences

Jenny Du, VP, Operations and Compliance

Founded in 2012 by UCSB alumnus **James Rogers** (PhD Materials, 2012) with key funding from the Bill & Melinda Gates Foundation, Apeel has developed an edible coating made of plant-derived products that is applied to harvested fruits and vegetables to dramatically extend their shelf life and reduce spoilage. Based in Goleta with presences in Mexico, Peru, and the Netherlands, Apeel currently employs 130 people and expects to add at least 70 more over the next year. Jenny Du says that the company is currently at the stage of “scale-up beyond startup. We believe the proof of concept has been well demonstrated. Coming off our first year of having product available in the market, it’s about commercializing the business, continuing to grow, and prepping the business to take on that growth.”

Most surprising aspects of the startup world?

Having a certain amount of naiveté going in is almost an advantage, because if you knew everything that would be involved beforehand, it would be easy to talk yourself out of it, to say, ‘How am I going to do all this?’ It has also been great to see how communal and helpful the entrepreneurial community is. There’s no shame in not knowing, and if you put yourself out there, you will find people who are willing to share their experience with you.

Advice to aspiring entrepreneurs? This never gets easier. Your reward for overcoming a challenge or an obstacle is a bigger challenge or obstacle. If you get into this thinking you can just get started and then hit cruise control, it’s probably not going to happen. To young and ambitious types, I would say that a little humility goes a long way.



Apeel leadership (from left): Jenny Du, James Rogers (CEO), and Louis Perez (VP Technology).

As soon as TMP became an academic unit, Seibold moved over to become one of the first faculty members. “Hiring faculty was hard in some ways, because we didn’t have a business school or a full department quite yet,” York notes, “but we managed to get **Kyle Lewis** [TMP professor and current chair] and **Paul Leonardi** [TMP professor and Duca Family Endowed Chair] to come. They’re adventurous people and they believed in the program. It has been smooth sailing since we hired them.”

Shaping the entrepreneurship component of TMP is the responsibility of lecturer **David Adornetto**, an experienced businessman who works closely with Lewis and runs the New Venture Program (see page 20) with the support of local entrepreneurs and TMP lecturers

interest to organization scientists.”

Lewis also knits together the subtleties of how entrepreneurial training, whether from a startup perspective or an academic one, complement each other.

“People might see the startup environment as distinct and separate from the organizational science we do here, but it isn’t,” Lewis notes. “For example, the kinds of things that the students learn as they prepare for the NVC, the kinds of things you have to do to think about a startup — who is your customer, how big your market is and how much of it can you capture, what do the users in your market really want or need, and many other considerations — all of these marketing- and finance-orientated questions are outside of the technology itself, but they

“We have a lot of talented folks who succeed elsewhere, land here with a lot left in the tank, and want to do things.”

John Greathouse and **Jason Spievak**. “We have an embarrassment of riches in Santa Barbara, talented folks who succeed somewhere, land here with a lot left in the tank, and want to do things,” York says.

Now TMP’s entrepreneurial offerings, open to students across campus, are balanced by two management-based degree tracks — the PhD in Technology Management, which began in 2016, and the professional Master of Technology Management (2013) — plus the Graduate Program in Management Practice Certificate, and the undergraduate Technology Management Certificate.

The academic side of TMP also benefits from the close proximity of the department’s startup activity, much of which is centered around the New Venture Competition, now in its twentieth year, and the startups launched before or after it.

“It is not well understood that there is scholarship around entrepreneurship,” Lewis says. “We have an opportunity to help entrepreneurs but also to have the entrepreneurs be part of the research that we do. So, for example, the teams involved in the NVC or that are being incubated — these are teams that we could potentially study. It gives us a nice little living laboratory to investigate some of the research questions that are of

are fundamental to almost any business enterprise. So, it’s not just for those who want to start new companies. It’s a general set of concepts and problem-solving skills that will serve our students well in any corporate environment.”

Further, adds Adornetto, looking at a business in such depth makes you a more engaged and valuable employee.

In the past few years, California Assembly Bill 2664 has enabled the creation of three important facilities that provide essential space and services for startups. (See article on page 21.) Within the California NanoSystems Institute (CNSI), the Center for Scientific and Engineering Programming (CSEP) supports graduate students primarily — and especially those in underrepresented populations — to become aware of and gain access to entrepreneurial opportunities across campus.

Finally, the Office for Technology and Industry Alliances supports UCSB inventors with assistance in licensing their intellectual properties if that is the appropriate route for them to bring their ideas to market.

Since the early days of ARPANET, UCSB has gone from running a highly successful non-degree co-curricular program to offering degrees and wide-ranging support for those seeking to make a difference by connecting technology to enterprise.

Marathon Before the Launch

For 20 years, the New Venture Competition has been a key to unocking student startup power.

The annual spring New Venture Competition (NVC), which began life as the Business Plan Competition and is celebrating its 20th anniversary this year, lies at the heart of the UCSB student entrepreneurial experience. Multiple successful startups have been launched by teams that finish at or near the top of the competition, including Inogen, Apeel Sciences, Milo Sensors, Shilo, and EV Match.

The process begins in fall quarter, when **David Adornetto**, Technology Management Program (TMP) lecturer, NVC director, and startup veteran and consultant with more than 25 years of experience in the tech business world, holds a series of information sessions to welcome students and inform them about what the NVC offers. About 250 students from across campus attend the sessions. Some then realize they don't have the time for the required commitment, and the others form into what are typically thirty to forty teams.

Early on, Adornetto sets up students in a kind of "speed-dating" setting for them to meet each other and mentors from the community who want to help, and to start brainstorming, swapping ideas, and getting feedback on whether they have a sound idea and should proceed, should look at their idea in a different way, or should come up with a different idea. They spend the next eight months developing, testing, and redirecting their product or service to reflect what they discover while identifying and validating their market and customer. Along the way, they rehearse elevator pitches and receive guidance from TMP lecturers, local angel investors, entrepreneurs, and other experts while attending to dozens of related tasks.

"The fall-quarter priority is ideation, team formation, and mentor introductions," says Adornetto.

For some teams, the process leading to the NVC is an engaging and novel way to acquire business skills and insights they would probably not get any other way. For others, it's an invaluable, essential process for reaching their goal of actually launching a startup business.

In the past few years, NVC offerings have been expanded to include a variety of new-venture programs that more broadly support students to succeed not only in the NVC, but also after graduating. In that work, Adornetto is joined by a group of highly experienced educators and mentors, both within and beyond UCSB, including local entrepreneurs and TMP lecturers **John Greathouse** and **Jason Spievak**.

Winter quarter is when the teams start to develop a business model around their idea. They work with something called a 'business model canvas,' which takes a diagrammatic, fill-in-the-boxes approach to identifying and monitoring progress on processes and tasks. "It has replaced the old business plan, which was thirty pages long and out of date by the time it came out of the printer," Adornetto explains. "The



Startup mentors: NVC director David Adornetto (left) and fellow TMP lecturer Jason Spievak in the Wilcox New Venture Incubator.

canvas framework allows a much more fluid approach to developing a business model considering nine specific attributes. It's a process of developing a set of hypotheses and then going out to the market to prove or disprove them. If you prove them, then you persevere. If you disprove them, you pivot."

Students have several options in winter quarter. They can take a course called "Developing a Market Tested Business Model," which requires them to conduct at least ten customer interviews per week to refine their understanding of the market and their customer. Also in winter quarter, students can participate in a new-venture workshop series, which, in addition to supporting their business-model development, exposes them to legal considerations for startups, financial literacy, and a variety of entrepreneurial guest speakers.

Adornetto summarizes the spring-quarter experience as getting the students ready for competition. The teams learn to develop and refine an elevator pitch, create an investor pitch deck, and craft a story that effectively describes their business and the value it provides. "Storytelling is an essential element of the process," Adornetto says. "A great idea communicated poorly can doom a startup."

Throughout the eight-month program, students work alongside mentors who help guide them through the process. Adornetto notes, "Our program is built on the backs of our mentors and instructors, an amazing group of entrepreneurs and business professionals who value giving back. They do a tremendous job with our students."

In May, twenty teams are chosen to participate in the New Venture Fair. They set up poster presentations and exhibits and deliver their pitch to the crowd of attendees, some of whom carry score sheets and help to choose six finalists to participate in the NVC Finals in Corwin Pavilion. Forty thousand to fifty thousand dollars in seed financing is awarded each year to the winners of various categories. It's an exciting and impressive finale to an entrepreneurially intensive academic year.

Inogen

Ali Bauerlein, Executive VP, Finance

Bauerlein ('03) and the Inogen team won the Business Plan Competition (now the New Venture Competition) in 2001, when she was a sophomore earning her degree in economics/math. The company makes lightweight, compact, portable oxygen concentrators for those who require supplementary oxygen, such as Bauerlein's grandmother, Mae, who provided the inspiration for the product. Inogen was founded in 2001, delivered its first device in 2004, and is now traded on the NASDAQ.

Entrepreneurial experience at UCSB? The business-plan competition has become a lot more robust than when we were there, but even then, they had highly engaged advisers, plus the actual faculty in CEEM [now TMP]. We went to all the entrepreneurship speaker sessions and attended a free conference to interact with experts. Through those, we created relationships with people in town who could help us on the product-design side and the business side. A local law firm also paid all our legal fees to incorporate. Tapping into that network was critical for us to get started.

What has been the biggest challenge? The out-of-the-gate struggle for us was getting conflicting advice, which made it hard to see a path forward. Each person was influenced by what worked for them in their specific situation. There are also a lot of ups and downs. Even the most successful startups have times when they feel like they're not going to succeed and are worried about making payroll.

Advice to aspiring entrepreneurs? To students, I say go for it. You're used to living off little money and don't have a lot of fixed expenses. You'll never be in a more flexible position than you are now. And you will learn a ton.



Oxygen to go: Inogen founders (from left) Brenton Taylor, Ali Bauerlein, and Byron Myers.

Space for Startups

At UCSB, state funding results in valuable new facilities to support fledgling companies

California Assembly Bill 2664, signed into law by Governor Jerry Brown in 2016, created a \$22 million fund to be distributed equally among the ten UC campuses to support investments in infrastructure, incubators, and educational programming focused on innovation. At UCSB, entrepreneurship and startup culture received a big boost.

Two new spaces — the Wilcox New Venture Incubator and the CNSI Innovation Workshop — were created with the funding, and a third, the CNSI Technology Incubator, was greatly expanded.

"The Central Coast has become a vibrant hub for startup activity, with UCSB students and faculty leading the way in creating jobs and opportunities for entrepreneurs," says UCSB professor of chemical engineering and CNSI director, **Craig Hawker**. "At CNSI we have developed a unique wet-lab infrastructure and community space that is critical for helping start-ups navigate the initial demonstration and prototyping phase. These spaces enable us to build on the strengths of UCSB and continue our outstanding success rate in establishing viable companies and extending our impact as a growth engine for the Central Coast."

Here are a few ways the incubators further entrepreneurship at UCSB.

Wilcox New Venture Incubator

The Wilcox New Venture Incubator, also known as "The Garage," is a central nexus for startups. It's a comfortable, modern space where teams can meet with each other as well as with mentors, potential funders, legal advisers, marketing experts, or any other relevant parties.

The Garage was created as part of a broad effort to better support startups and give them their best chance at success. "When I arrived at TMP, we had the New Venture Competition [NVC], which ran from October to May, but teams had no clear path forward from there," says TMP lecturer and NVC director, **David Adornetto**. "There was really no support infrastructure. We wanted to develop something to extend the runway, because it's a tough road, so we built the

Wilcox New Venture Incubator on campus to provide a convenient space where teams could receive ongoing help and support."

With the space has come programmatic support, such as the G2 Summer Launchpad, a startup accelerator designed to facilitate the transition from ideation and business-model development to product commercialization and business launch. Adornetto explains: "The teams that are accepted into G2 reside in the Garage for that summer. The program provides ongoing entrepreneurship education, networking with mentors and investors, and coworking to facilitate knowledge transfer. If one group solves a particular problem, others can learn from their experience. In this respect, there's a valuable community aspect to it."



Fluency Lighting employee Jordan Reed fabricates a part in the the Innovation Workshop.

CNSI Technology Incubator

This incubator opened in spring 2015, but AB 2664 funding allowed for it to double in size and receive substantial equipment enhancements to support companies working in chemistry and biology as well as in electronics, photonics, and other areas that do not require a wet lab.

Tal Margalith, Executive Director of

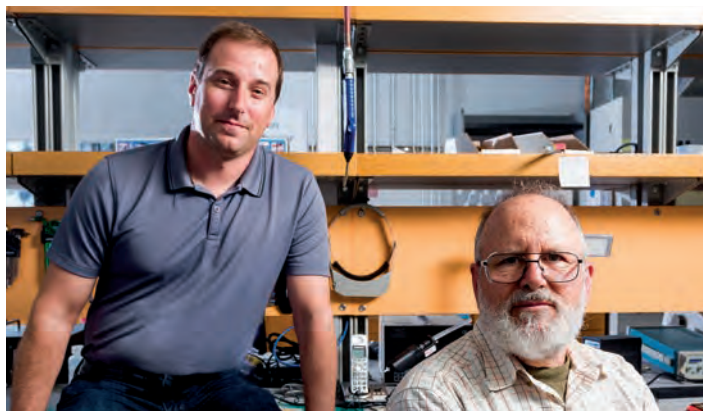
Technology at CNSI, oversees the incubator, which currently houses seven UCSB startups. Five of those companies — bioProtonics, Fluency Lighting Technologies, Mentium Technologies, Milo Sensors, and Nexus Photonics — have secured funding from the NSF's Small Business Innovation Research

Grants (SBIR) program. The funding received by these companies has ranged from \$225,000 to \$2 million in Phase I and Phase II grants (the R&D parts of SBIR's three-phase program.) Laxmi Therapeutics, started by UCSB mechanical engineering professor **Sumita Pennathur**, and CZero, founded by UCSB chemical engineering professor **Eric MacFarland**, also incubate at CNSI.

"It's a long road from coming up with the idea or getting some initial lab results to developing a market-ready product that can attract investors and reflects the needs of an identified market. We provide an affordable place to develop physical prototypes," Margalith says. "With the modest funding they have, companies can incubate here and leverage UCSB's ecosystem before moving on. Hopefully, by that point, they have proven their technology and can raise money to find a space and go into full production."

"Being able to rent lab and office space in the CNSI incubator has been invaluable to us as an early-stage startup company," says **Kristin Denault** (PhD '15), founder of Fluency Lighting Technologies. (See sidebar.) "The existing laboratory infrastructure, close access to UCSB user facilities, and collaborative working environment have allowed us to pursue our R&D goals rapidly and with limited resources, access the expertise and state-of-the-art equipment available at the university, and develop our business model while engaging with and learning from fellow entrepreneurs. Without the incubator, the time and cost associated with technology development can prohibit early-stage companies like ours from reaching their R&D goals, which is necessary to demonstrate value and create a business."

CNSI also has conference rooms for industrial pitches and customer



Tal Margalith (left) and David Bothman in the recently completed Innovation Workshop.

meetings, and recently, several soundproof booths were installed in the hallways to provide privacy for business phone calls or small meetings.

"I'm thrilled that there was a big investment over here on the hard-tech side of things," Margalith says. "Now we see more teams making use of these resources, which is great, because the spaces were designed to take products to market."

CNSI Innovation Workshop

The best way to develop ideas into products is to build, test, and persistently improve them. The College of Engineering has long supported a machine shop, which has facilitated countless inventions.

The Innovation Workshop, just down the hall from the Technology Incubator, supplements the traditional shop with an array of high-tech equipment. It houses seven high-end 3D printers, a laser cutter, and a CNC router — all with easy-to-learn-user interfaces. There is a workbench for assembling and testing electronic circuits, and one for programming and testing microcontroller-based machines. Traditional hand tools for mechanical, electronic, and plumbing assembly are also available.

"The Workshop provides the tools and training to use them so that Gaucho inventors can build prototypes of their ideas and test them," says **David Bothman**, who manages both the Innovation Workshop and CNSI's shared-use Microfluidics Laboratory.

"We're here to support campus innovation. CNSI's facilities complement UCSB's other shared labs and workshops," says Margalith.

The space was created with startups in mind, but it is available to anyone on campus, and Bothman and students he has recruited provide training on the equipment.

For contacts and further information, go to: innovation.ucsb.edu.

startup focus:

Fluency Lighting Technologies

Kristin Denault, Founder

While earning her degree in materials (PhD '15), Denault also received the Graduate Program in Management Practice Certificate from TMP and participated in the New Venture Program in 2014. Together, she says, "They gave me a great foundation to understand business terms and to start evaluating our technology from a business perspective. I was able to quickly learn basic business skills that would have taken me much longer to learn on my own. That gave me the business footing to start Fluency Lighting [which is working in the space of LED laser lighting for displays]."

What has surprised you most about the startup world? One nice surprise I've found is that there is a wealth of experience out there, and most people are willing to share it to help others along their path. I have had a number of mentors and have attended numerous events to hear from top business experts in their fields share their successes and failures. I have also participated in panels and discussions to share my experiences along my short entrepreneurial path so far, in order to help others who may be considering starting a business. I hope the startup world continues to share in this way.

Advice for aspiring entrepreneurs?

Finding good mentors is key. It's important to have that network of knowledge and experiences, because it's impossible to learn everything yourself. Also, I was told that having a co-founder is important, but I wish I was told how important it is to have the *right* co-founder, and that having no co-founder over the wrong one is better.



Lit-up startup: Fluency founder Kristin Denault.

Shilo

Ryan Kim, CEO

A year after founding Shilo, which began life as Adomi, **Ryan Kim** and fellow Class of 2018 graduates **Saliq Hussaini**, **Vahan Ghazaryan**, and **Tomi Kapoor** are preparing to deliver their first prebuilt accessory dwelling units, aka “granny flats,” to the market. Most of the team took at least one or two courses in the Technology Management Program. Two of them earned the undergraduate certificate in technology management. “That prepared us really well to submit our application for the New Venture Fair,” Kim says.

They placed in the top six at the fair and second in the 2018 New Venture Competition (NVC), earning \$12,500 plus another \$7,500 from UCSB by qualifying for the G2 Summer Launchpad program. They then moved to the Wilcox New Venture Incubator to refine their plan and learn through in-person meetings with leading Santa Barbara-area entrepreneurs.

Most valuable elements of your UCSB entrepreneurship training? The NVC and the G2 Launchpad. Up to that point, the idea of startups was intangible to me. You need to interact with people who have been through it to learn about the good and the bad, the best and the worst practices.

Most surprising aspect of your startup experience? Finding so many people who are willing to help. There is an entire community that has been fostered by entrepreneurship in the Santa Barbara area. It was the most awesome surprise.

Advice to aspiring entrepreneurs? If you are willing to put yourself in a vulnerable position and are willing to learn, the right people will gravitate to you. If we had been really discreet and private, our company never would have happened.



Shilo founders (from left) Tomi Kapoor, Ryan Kim, Saliq Hussaini, and Vahan Ghazaryan.

Where Entrepreneurs Come to Thrive

Over the past nearly thirty years, UC Santa Barbara and the Santa Barbara-Goleta area have emerged as a significant center for entrepreneurship. New technologies, innovations, and ideas are being generated constantly at UCSB, fueling the entrepreneurial and startup environments. According to **Sherylle Mills Englander**, director of UCSB’s Office of Technology & Industry Alliances (TIA), which licenses intellectual properties to industry, more than one hundred companies have been launched from UCSB inventions and new-venture programs, with four to eight startups being formed every year.

The many successful companies launched out of UCSB (see sidebar) have attracted investors and entrepreneurs who previously built their own successful companies, sold them or took them public, and then moved here. Some have established venture-capital funds, gravitated to the UCSB idea factory, and re-engaged with the local startup culture. More companies have been launched, providing good-paying jobs that fuel the local economy and enable more UCSB graduates to remain here after school, further extending the community of experts who support local entrepreneurship.

The result is that UCSB has its fingerprints on tech startups all over the Central Coast and on multiple global companies. “If you look at a whole collection of big companies, you see that they’re populated by UCSB alumni,” says Technology Management Program (TMP) lecturer **Jason Spievak**, who, with his partners, runs Entrada Ventures, a seed-stage investment fund. In March, he noticed that nearly every Central Coast company in which the fund was going to invest has its roots at UCSB.

“A handful of technology companies founded in Santa Barbara about twenty years ago have spawned all these other companies today,” he notes. “Over that time, more than ten billion dollars’ worth

of shareholder value has been generated in Santa Barbara alone.”

John Greathouse, Professor of Practice in TMP, is also an investor and serial entrepreneur who worked with former UCSB professor and founder of Expertcity **Klaus Schauer** to help grow and ultimately sell the GoToMeeting business to Citrix. He also worked with UCSB alumnus **Yulun Wang** to help launch Computer Motion, which essentially created the field of medical robotics. It merged with Intuitive Surgical, which now has a market capitalization of roughly \$50 billion.

Greathouse has seen dramatic changes from the sleepy Santa Barbara he found when he arrived in 1993. “If you look at per-capita statistics on venture capital money raised, VC jobs created, and IPOs, pound-for-pound the Central Coast is as robust as any other strong tech community,” he says. “I think we’re in the very early stages of what Santa Barbara is going to become. In the next twenty to thirty years, a lot is going to happen on the Central Coast, and UCSB will be driving it.”

Students have broad access to this fertile entrepreneurial playing field. Accepted UCSB undergraduate students might attend an event where TMP chair, **Kyle Lewis**, describes the value of having both a major in a chosen subject and supplemental real-world business and technology-management skills. Graduate students, and especially those in underrepresented groups, might learn about it at an event or programs offered by **Lubi Lenaburg**, associate director of the Center for Science and Engineering Partnerships (CSEP) in the California NanoSystems Institute (CNSI), to raise awareness of entrepreneurship opportunities and funnel students toward them. At the Bren School of Environmental Science & Management, lecturer and program manager, **Emily Cotter**, supports students in the Eco-Entrepreneurship program, while students in technical areas

Faculty Entrepreneurs

Some notable startups founded by UCSB College of Engineering faculty

Digital Instruments, founded in 1987 by former UCSB physics professors **Virgil Elings** and **Paul Hansma**; sold to Veeco for \$150 million in 1998.

Terabit Technology, acquired by Ciena in 1998, and CALIENT Technologies, founded in 1999 and acquired by Suzhou Chunxing Precision Mechanical Co., Ltd. in 2017 for \$290 million; both started by **Professor John Bowers**, electrical and computer engineering.

Software.com, founded in 1992 by former Bowers PhD student **John McFarland**; acquired by Phone.com for \$6.8 billion in 2000. McFarland then launched Sonos, which he runs today.

Optical Concepts (1991) and Agility Communications (1998), founded by **Professor Emeritus Larry Coldren**, electrical and computer engineering, to commercialize his innovations in lasers.

Commission Junction, online pay-for-performance advertising provider that became the world's largest affiliate network. Founded by UCSB alumnus **Per Pettersen**, also founder of Savings.com and Impact.

Soraa, launched by UCSB materials professors **Steve DenBaars** and **Shuji Nakamura**. DenBaars later partnered with **Umesh Mishra**, professor of electrical and computer engineering, to found Nitres, acquired by Cree Research for \$212 million in 2000. Mishra later founded Transphorm.

Computer Motion, founded by former UCSB professor **Klaus Schauer** and TMP Professor of Practice **John Greathouse**. They were also part of a UCSB-alum-heavy group that developed GoToMeeting at Expertcity, sold to Citrix for \$240 million.

might be introduced to startup culture by **Tal Margalith**, executive director of technology at CNSI, who may send them to **David Adornetto**, director of TMP's New Venture Competition, to learn about validating the market for their technology.

"Students don't come to UCSB to be entrepreneurs," Great-house says, "but I've had so many students who, after being exposed to these classes, say to me, 'This program changed my life, because I came here to be X and now I'm going to become an entrepreneur and change lives.' I think it's just giving people permission and showing them role models, people like them who came to UCSB and did this."

Adornetto explains that the skills students learn in the new-venture program provide an advantage whether or not they pursue a startup. "These skills are transferable," he says. "The same concepts that are critical to launching a business are also critical to growing innovative entrepreneurial tech companies. These students will bring the entrepreneurial skillset and mind set — what we call *intrapreneurship* — into a company."

startup focus:

EVmatch

Heather Hochrein, Founder

EVmatch extends the range of electric vehicles by connecting users with a community of "hosts" who offer charging facilities away from home for a small fee via a smart phone app. Hochrein (MESM '16) started the company with **Shannon Walker**, who has since moved to other pursuits, as the capstone for their master's Eco-Entrepreneurship (Eco-E) program at UCSB's Bren School of Environmental Science & Management. Eco-E is directed by **Emily Cotter** and is closely aligned with the College of Engineering's Technology Management Program (TMP). After graduating, EVmatch received a Bren fellowship and state grant funding to build their technology. The first product launched in 2017, and EVmatch has since released a commercial platform enabling businesses, hotels, and apartment complexes to host service for EVmatch users.

What was your involvement in UCSB entrepreneurial activities? We placed in the New Venture Competition. We took a class in finance. The grant was essential to building and launching the minimal viable product, and the fellowship from Bren was critical.

Your biggest challenge as a startup? Accessing capital is difficult, especially if you have an idea but no product yet. Angels and VCs have elevated the amount of traction required to get funding. That's why government funding resources are critical when you are starting out.

Advice for aspiring entrepreneurs? Be committed and willing to sacrifice. Leverage the resources of your network and the UC system, not only for financial support but also to recruit employees and team members to your company. Your personal network is valuable. Software developers for us came from friends of friends. It's helpful to have people who know you and have faith in you.



Plugged in to EVs: Heather Hochrein