

RISING TIDE



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“SUCCESS IS
WALKING FROM
FAILURE TO FAILURE
WITH NO LOSS OF
ENTHUSIASM.”

— Winston Churchill



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about UCI's innovations and
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Find this issue of Rising Tide at
innovation.uci.edu/news

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EVENTS

Past Tides

EVENTS AT THE
COVE @ UCI

Applied Innovation Makes a Sweet Move / April 2019

The UCI Applied Innovation team celebrates the construction of Applied Innovation's new building with an ice cream social at the new location. The Applied Innovation team will relocate fall 2019.



PHOTO BY: YUXIN CHA



PHOTO BY: AMY VONG

Applied Innovation Camps Out on Campus for UCI Homecoming / February 2019

Alumni, students, faculty and staff return to a decked out Aldrich Park on the UCI campus to celebrate UCI's annual homecoming event. Applied Innovation educates the crowd about available programs and resources.



PHOTO BY: YUXIN CHA

New Venture Competition Hosts Intellectual Property Workshop / February 2019

Richard Tun, UCI Applied Innovation senior licensing officer, talks about the ins and outs of intellectual property as it relates to the university during a New Venture Competition workshop held at the Cove @ UCI Applied Innovation.



PHOTO BY: BEN LI

Velox Biosystems' Byron Shen Shares Pitch Deck Pointers / March 2019

Byron Shen, CEO of UCI Applied Innovation startup Velox Biosystems, discusses pitching tips and his 10 key elements for a pitch deck during a Lunch & Learn at the Cove @ UCI Applied Innovation.



PHOTO BY: AMY VONG

Grad Slam 2019 / March 2019

2019 Grad Slam first place winner Rachel Rosenzweig, materials science and engineering grad student, stands with Peter the Anteater and Frances Leslie, vice provost of Graduate Education and dean of UCI Graduate Division, during the Graduate Division's fifth annual UCI Grad Slam competition at the Cove @ UCI Applied Innovation.



PHOTO BY: JACKIE CONNOR

Center for Creative Leadership Talks Retention Crisis for Women in STEM / March 2019

Leaders and consultants from Southern California's business community, members from UCI campus and partners from UCI Applied Innovation discuss an action plan to address retention of women working at the senior level within the Science-Technology-Engineering-Math (STEM) fields in Applied Innovation's Screening Room.



PHOTO BY: BEN LI

ENP Spotlights SB 826 During Annual Women's Summit / March 2019

Executive Next Practices (ENP) hosts an event, "Boardroom Evolution: Women Driving Performance, Perspective & Results" at the Cove @ UCI Applied Innovation to spotlight Senate Bill No. 826, which says publicly-held companies in California must have at least one woman on their board of directors by the end of 2019.

RECURRING EVENTS AT THE COVE @ UCI

1st
FRI

Lunch & Learn

DATE: Once a month
TIME: Noon to 1 p.m.

Subject matter experts present on a particular topic relevant to innovation and entrepreneurship. Topics range in breadth from branding and marketing to avoidable pitching mistakes to working with investors.

Free to the public.
Light beverages are provided.

every
WED

1 Million Cups

DATE: Every Wednesday
TIME: 8 to 9 a.m.

Two startups give a six-minute presentation after which the audience asks questions and gives feedback with the intention to help the presenting startups grow.

Free to the public.
Coffee and tea are provided.



COVE

The Cove @ UCI is host to more than 700 events per year in support of innovation, entrepreneurship, industry and the community. Take part! Check out and register for upcoming events: innovation.uci.edu/events



Innovation Advisors like Richard Brazill meet one-on-one with entrepreneurs of all stages to provide valuable guidance in their respective areas of expertise.

RESOURCE

Introducing the Innovation Advisors Network

PROMOTING STARTUP SUCCESS
THROUGH MEANINGFUL GUIDANCE

Just as startups strive to develop into bigger and better versions of themselves, so does UCI Applied Innovation and the programs and resources it offers entrepreneurs. One such program that has undergone an evolution is the network of business leaders who volunteer their time to mentor UCI-affiliated startups.

Introduced as the Experts-in-Residence (EiR) program, the newly named Innovation Advisors network program has been rebuilt with every aspect revamped to better serve startups.

“The EiR program has seen continued success since its inception,” said Matt Hanson, director of New Ventures at UCI Applied Innovation. “And, we are building upon that success to reinvigorate the program and make it even more effective for our entrepreneurs.”

The Innovation Advisors will continue to be an assembly of business leaders, but they will now have expanded roles and recognition.

Under the supervision of the Innovation Advisor manager, Innovation Advisors will mentor and coach UCI-affiliated startups. They will offer guidance on the patentability and commercial potential of startups’ intellectual property, review grant proposals, present at workshops and events*, and serve as competition judges. These members bring business-to-business and business-to-consumer experience from industries ranging from high-tech to high-touch, and in areas including finance, operations, human resources, marketing, law and more.

Furthermore, Innovation Advisors will have the opportunity to serve on the newly formed Innovation Advisors Council, which will recommend strategies and tactics to continuously improve the Innovation Advisors network as well as other Applied Innovation programs* and services.

With this new evolution, the Innovation Advisors network is poised to give entrepreneurs their best chances at success.

To learn more about the Innovation Advisors network, visit innovation.uci.edu/programs/innovation-advisors ///

*Resources Mentioned in this Story

Events
innovation.uci.edu/resources

UCI Applied Innovation Programs
innovation.uci.edu/programs

HELLO
my name is

~~Expert-in-Residence~~
Innovation Advisor

The Innovation Advisor network program was renamed to better reflect the expanded roles of program participants.

AVAILABLE TECHNOLOGIES

Coming Down the Pipeline

SOME OF UCI’S TOP AVAILABLE TECHNOLOGIES CURATED BY UCI APPLIED INNOVATION’S INVENTION TRANSFER GROUP

The Invention Transfer Group manages over 1,000 inventions from UCI researchers spanning the areas of engineering, medicine and life sciences, physical sciences, communications and computer sciences. These innovative technologies are available for licensing.

Tech ID #: 27633

NONLINEAR OPTICAL PHOTODYNAMIC THERAPY (NLO-PDT) OF THE CORNEA FOR TREATMENT OF LOW REFRACTIVE ERRORS

Inventors at UC Irvine have developed an apparatus and method using (NLO-PDT) for modifying corneal shape and treating progressive corneal astigmatism and refractive errors. The selectively focused femtosecond-near infrared laser light and apparatus improves upon existing methods by providing rapid (< 1 min.) corneal treatment that minimizes unwanted cellular damage to the eye through precise lateral and axial treatment to the cornea.

James V. Jester, Ph.D. / UCI School of Medicine

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Tech ID #: 27435

IMAGING PLATFORM BASED ON NONLINEAR OPTICAL MICROSCOPY FOR RAPID SCANNING OF LARGE AREAS OF TISSUE

Researchers at UCI have developed a nonlinear optical microscopy (NLOM) instrument for the rapid and nondestructive imaging of wide areas and large volumes of biological tissue. Imaging can be performed either outside or inside a living organism, and with sub-micron resolution at higher scanning speeds than previously possible.

Mihaela Balu, Ph.D. / Beckman Laser Institute

Licensing Officer
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Tech ID #: 30161

PROTEIN NANOPARTICLES FOR CANCER IMMUNOTHERAPY

Though new therapeutics for the treatment of cancer are constantly being developed, they often show low efficiency for long-term remission, adverse side effects and low immune response. Scientists at UCI have found a way to combat these issues with a combination therapy delivered by nanoparticle of both a vaccine, to prime the immune system, and a checkpoint inhibitor to shut down anti-cancer immune responses. This has been shown to prolong survival and promote immune response and immunological memory related to long-term survival.

Szu-Wen Wang, Ph.D. / Henry Samueli School of Engineering

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Tech ID #: 30162

METABOLITE-RESPONSIVE HYBRID BIOMATERIALS

Researchers have developed a “smart” biomaterial for drug delivery systems capable of responding to signature cancer metabolite concentrations in tumor environments. This response triggers the release of encapsulated drugs at a specific tumor target.

Szu-Wen Wang, Ph.D. / Henry Samueli School of Engineering

Licensing Officer
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Find all UCI-available technologies at innovation.uci.edu/tech

Elliot Botvinick:

UCI Professor, Researcher turned Entrepreneur Extraordinaire

HE AND HIS TEAM OF RESEARCHERS PLAN TO SAVE LIVES ONE MED TECH STARTUP AT A TIME.

Within the glass walls of UCI's massive Henry Samueli School of Engineering lies several labs fashioning innovative devices and concepts, many with commercial potential. While wandering through the second floor of labyrinth-like hallways, one might stumble upon the Edwards Lifesciences Center for Advanced Cardiovascular Technology and, behind secure access, Elliot Botvinick, Ph.D., and his team of researchers tinkering away with innovations that could one day save millions of lives.

TEXT BY: JACKIE CONNOR / PHOTOS BY: AMY VONG

RICHARD [SUDEK] HAS CREATED SOMETHING SPECIAL AND RARE. IN FACT, WHAT HE BUILT IS ONE OF THE REASONS I NEVER LEFT UCI."

– Elliot Botvinick, Ph.D.



Elliot Botvinick (far left), UCI professor of biomedical engineering and co-founder of startup company Cactus Medical, discusses the company's otoscope with a "magic button" with John Weidling, Cactus Medical co-founder and systems engineer.

Since 2001, Botvinick, a biomedical engineering professor, has accumulated more than 20 invention reports and four patents issued through UCI Applied Innovation. But there's no rest for the weary as Botvinick continues to forge the path for his team – all who live and breathe innovation for the greater good.

The name of the game is "rapid detection" and Botvinick and his team apply it to ear infections in children, Type 1 diabetes and sepsis.

CACTUS MEDICAL

Botvinick has an exclusive option to license the technology for a rapid detection device for ear infections with Cactus Medical, a startup company that utilizes an all-optical noninvasive way of detecting fluid in the ear – otherwise known as middle ear effusion – in children, an often misdiagnosed condition leading to over-prescription of antibiotics.

"Elliot has a real knack for entrepreneurialism, so he's been involved with a number of different companies," said Sean White, entrepreneur and co-founder of Cactus Medical. "Elliot really plays to his strengths, which is taking all these intellectual assets that he has and then building companies in such a way that they leverage those assets in the best way possible."

Along with Botvinick, CEO Samir Shreim and three others, White co-founded the company based on Botvinick laboratory's rapid detection technology. What appears to be a standard otoscope, a medical device used to look into the

ears, now has, as the team calls it, a "magic button" that, in addition to a visual assessment, provides the clinician with a metric that tells them if the child has middle ear effusion.

"The magic button is key," said Samir Shreim. "We've spoken to physicians all over the country about their challenges in diagnosing ear infections in young kids. The key is that it has to be simple and easy to use. Our tech is sophisticated, but it's reliable and easy for the user. That's the hallmark of good engineering; it's Elliot's hallmark and the key to our success."



OUR TECH IS SOPHISTICATED, BUT IT'S RELIABLE AND EASY FOR THE USER. THAT'S THE HALLMARK OF GOOD ENGINEERING; IT'S ELLIOT'S HALLMARK AND THE KEY TO OUR SUCCESS."

– Samir Shreim

APPLIED INNOVATION

Botvinick's relationship with UCI Applied Innovation has been prolific. In 2016, he was one of the first UCI researchers to receive funding for his technology licensed to Cactus Medical through Applied Innovation's Proof of Product Grant* program (POP Grants), a program that accelerates the development of UCI's commercially promising technology. Since 2016, the program has incorporated funds from Assembly Bill 2664 (see sidebar on page 8). The bill continues to fund technologies across campus that have commercial potential. Cactus Medical also recently secured a National Science Foundation phase 1 SBIR* grant of \$225,000 and the support of the Consortium for Technology in Innovation in Pediatrics, an FDA-sponsored pediatric device accelerator. Cactus Medical is developing partnerships with clinical sites for data collection, as they hone their go-to-market strategy and further refine their technology.

In addition to Applied Innovation's POP Grants program, Botvinick has also participated in the I-Corps* program where he was an industrial mentor for researchers in the program. He also utilizes Applied Innovation's licensing officers* for patenting services.

"It's a close relationship allowing us to use patent attorneys and just being involved every step of the way," said Botvinick. "When I speak to my colleagues at other universities, they simply don't have this experience. Richard [Sudek] has created something special and rare. In fact, what he built is one of the reasons I never left UCI."

O-TO-SCOPE noun

a medical device used to look into the ears

What is AB 2664?

In 2016, the University of California, Irvine received \$2.2 million from the state administered through UCI Applied Innovation to help speed research and innovations toward commercialization.

Assembly Bill 2664 requires the University of California to make one-time expenditures for activities to expand or accelerate economic development in the state in ways that are aligned with other efforts to support innovation and entrepreneurship. The bill allocated \$2,200,000 under that appropriation to each of the 10 campuses in the University of California system.

UCI Applied Innovation managed UCI's allocation of \$2.2 million, with another \$2.2 million provided as a match by UCI, through complimentary programs designed to help grow campus startup companies based on technologies developed in UCI's Henry Samueli School of Engineering, School of Medicine and School of Biological Sciences, among others.

HOW IT HELPED AI & OTHER SCHOOLS AS A WHOLE:

The funding supports the Bridging Innovation Gaps Initiative at UCI, which provides a continuum of resources through Applied Innovation programs that help bring UCI-based technology closer to commercialization:

BioEngine program: real-world product development and training program that harnesses the collective creativity of industry and UCI undergraduate students to advance innovative healthcare solutions.

Proof of Product (POP) Grants: a funding program that helps faculty innovators accelerate the development of UCI's commercially promising technology.

Small Business Innovation Research (SBIR) and Small Business Technology Transfer* (STTR) support: application support for highly competitive programs that expand funding opportunities in the federal innovation research and development arena.

HOW IT HELPED OTHERS:

AB 2664 helps contribute to Applied Innovation's efforts to create a campus culture of innovation and advance more research toward commercial potential. Below are a few UCI faculty members who received POP grants for their pioneering research:

- Aimee Edinger / School of Biological Sciences, developed molecules that disrupt intracellular transport to treat cancer
- Maksim Plikus / School of Biological Sciences, developed stimulation of hair growth by cell-derived factors
- Michelle Khine / Henry Samuel School of Engineering, developed a wearable asthma-sensing respiratory monitor
- Abraham Lee / Henry Samuel School of Engineering, developed highly efficient platform for droplet-based genomic sequencing

FIELDIONICS, INC.

In conjunction with Cactus Medical, Botvinick has also decided to focus on rapid detection of Type 1 diabetes.

It started in 2016, after a speaker at the Beckman Laser Institute talked about the need to save injured soldiers who pass away despite normal vital signs. The speaker opened Botvinick's eyes to lactic acid as the gold standard for triage care, patient risk determination and treatment guidance.

"They think a lot of preventable deaths are because they couldn't tell they were severely injured," said Botvinick.

In addition to a plethora of his other inventions, Botvinick found this gap in medical care for soldiers relative to several other medical application, like sepsis. He made it his mission to help save lives starting with configuring the detection of lactic acid in relation to Type 1 diabetes and sepsis.

"With lactic acid, most people think about your sore muscles after you exercise ... it's something that's generated when you exercise too hard because you don't have the oxygen," said Botvinick. "When these patients are bleeding internally, the same effect occurs – they become inadequately oxygenated and the body starts producing lactic acid."

Botvinick's former grad student, and now co-founder of Cactus Medial and Fieldionics, John Weidling, Ph.D., developed a version of the continuous sensor as his thesis and after nine months, the team had a continuous lactate monitor working in a rabbit model and conducted their first human study in 2016.



A prototype of Fieldionics, Inc.'s continuous lactate monitor, which aims to help with the detection of glucose in patients with Type 1 diabetes.

MULTIPLE APPLICATIONS

Following 2016's intensive human study, the timeline began to blur for Botvinick once a large research foundation caught wind of the project and asked if the same technology could apply to measuring glucose.

Type 1 diabetes, also known as juvenile diabetes, is a chronic condition where the pancreas, a large gland located behind the stomach that secretes digestive enzymes, produces little or no insulin, a necessary hormone that regulates blood sugar levels. According to the Juvenile Diabetes Research Foundation, some 1.25 million Americans are living with Type 1 diabetes, which includes 200,000 who are less than 20 years old.

"Right now there are glucose sensors on the market and they're fabulous," said Botvinick. "If you're going to take that data and tell a pump how much insulin to deliver, what do you do when it's unknown? How are you going to trend – high or low – in the next three hours after exercise?"

People with Type 1 diabetes often closely monitor their diet and exercise routines to determine blood sugar levels, according to Botvinick. This summer, Botvinick will kick off a study at UCI that will determine if lactic acid is a reliable predictor of blood glucose trends following different types of exercise for people who have diabetes.

"The study has been approved, the devices have been vetted and we will be the first people in the world to answer whether or not knowing lactic acid can tell you what your sugar is going to be," said Botvinick.



WE WILL BE THE FIRST PEOPLE IN THE WORLD TO ANSWER WHETHER OR NOT KNOWING LACTIC ACID CAN TELL YOU WHAT YOUR SUGAR IS GOING TO BE.
– Elliot Botvinick, Ph.D.

THE FUTURE IS BRIGHT

Botvinick's lab group, Bio-Engineering of Advanced Mechanical Systems (BEAMS),

has locations at the Beckman Laser Institute & Medical Clinic and the Edwards Lifesciences Center for Advanced Cardiovascular Technology, where he and his team construct tiny, and not-so-tiny, devices that can make big differences in patient's lives.

Although Botvinick's innovations continue to progress within the walls of his labs, his primary focus remains on Cactus Medical, which is already taking foot down a path toward commercialization. Following not too far behind, he plans to take Fieldionics, Inc., to market by working with medical device companies, such as Dexcom, known best for their glucose monitoring systems. Further, Professor Ali Mohraz, Department of Chemical and Biomolecular Engineering, and Botvinick recently received a large grant to develop a new insulin infusion set for extended lifetime and faster delivery.

"If the infusion set works, we have every intention of disrupting the infusion set market. It's a multibillion-dollar market," said Botvinick.

If Fieldionics, Cactus Medical and the infusion set materialize into commercial successes, then Botvinick imagines working toward erecting a biomedical engineering building at UCI.

"My main focus would be to keep the snowball going – donating money toward a BME building, and ultimately having people who are smarter than me invent better things, get them commercialized and save people's lives," said Botvinick. ///

*Resources Mentioned in this Story

I-Corps
innovation.uci.edu/programs/i-corps

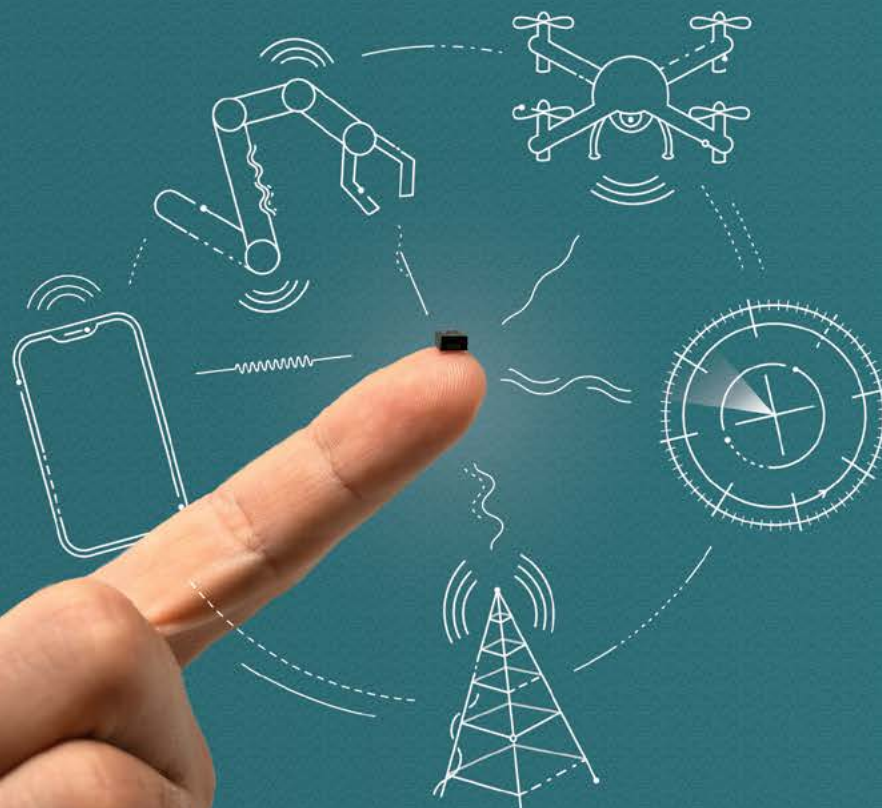
Licensing Officers
invention.uci.edu

Proof of Product Grants
innovation.uci.edu/programs/pop-grants

SBIR/STTR
innovation.uci.edu/programs/sbir-sttr

“FOR THE FIRST TIME IN 30 YEARS, WE ARE OFFERING A COMPLETELY NEW WAY TO DESIGN AND PRODUCE MICRO-DEVICES, OPENING THE DOORS FOR APPLICATIONS AND PRODUCTS THAT BEFORE COULD NOT BE REALIZED.”

– Paul Dhillon



STARTUP

Integra Devices

DOES BIG THINGS WITH SMALL DEVICES

ENGINEERS USE UCI INTELLECTUAL PROPERTY TO DISRUPT THE MICROELECTROMECHANICAL SYSTEMS INDUSTRY.

TEXT BY: ETHAN PEREZ / PHOTOS BY: EMILY MORRISON, RYAN MAHAR, AND PROVIDED BY INTEGRA DEVICES

Microelectromechanical systems (MEMS) – or miniaturized 3D devices with moving parts – are big business. MEMS can be found everywhere and in everyday consumer electronics devices, like smartphones and smartwatches.

This miniaturization of devices allows for technological advances and new applications, which then influence how we live our lives and interact with the world.

The problem is only a handful of devices have been successfully miniaturized despite many companies trying. Integra Devices – a startup based on UCI intellectual property – isn't just trying; it's succeeding thanks to their new way of thinking about constructing micro-devices. This new paradigm allows Integra Devices to not only design and create with a wider array of materials, but also develop a whole host of micro-devices that others have failed to miniaturize.



The Integra Devices team, including founders Mark Bachman, Ph.D., chief technology officer (front middle), and Paul Dhillon, CEO (front right).

A HISTORY LESSON

About a dozen years before Integra Devices was established in 2015, there was UCI Professor of electrical engineering and computer science Mark Bachman, Ph.D. – now chief technology officer of Integra Devices – who led numerous research projects for government agencies and contracts for industry leaders, including some asking him to create micro-devices.

At the time, MEMS were primarily created using silicon and an additive manufacturing technique from the semiconductor industry called thin-film processing, which builds devices layer by layer, one after another, until the desired result is achieved. Although effective, manufacturers were limited by the number of materials and processes used, and were therefore limited in the kinds of devices they could miniaturize.

Due to the limitations in MEMS manufacturing, Bachman, too, was unsuccessful at creating the micro-devices requested.

A NEW PARADIGM

Looking for answers, Bachman and his colleague, UCI Professor of electrical engineering and computer science Guann-Pyng “G.P.” Li, Ph.D., visited a microelectronics packaging company. These companies manufacture tiny housings, or packages, to protect computer chips from contamination and damage.

“I saw what they were doing and I realized that what they were doing wasn't ‘chip packaging,’ but actually precision manufacturing. G.P. Li and I asked ourselves, ‘What if the package was the device,’” said

Bachman. “From there, we immersed ourselves in heterogeneous integration and soon we were making microelectromechanical devices that we couldn't build before.”



The process of heterogeneous integration involves the separate manufacturing of components, which are later assembled together.

Heterogeneous integration, combined with precision manufacturing already utilized by the microelectronics packaging industry, allowed for a larger toolset from which Bachman and Li could draw from when creating micro-devices. No longer were they limited by silicon or thin-film processing.

UCI was awarded the fundamental patent for this new method – called Amalga™ – in 2014. Soon after, Bachman decided to transform the micro-device industry and founded Integra Devices with industry veterans Paul Dhillon, CEO, and James Spoto, chairman.

MI·CHRO·E·LEC·TRO·ME·CHAN·I·CAL / noun

the technology of microscopic devices with moving parts, also referred to as MEMS

"I remember when the first MEMS accelerometer was introduced about 30 years ago," said Dhillon. "Coming from the sensors and instrumentation industry, it was truly disruptive in the applications it enabled. Our technology reminds me of that disruptive introduction. For the first time in 30 years, we are offering a completely new way to design and produce micro-devices, opening the doors for applications and products that before could not be realized."

BIG IDEA, BIGGER MARKET

What makes Integra Devices' paradigm even more intriguing is that it does not require new manufacturing technologies or machines, as manufacturers already have the capabilities to fabricate components to specification.

The industry has been looking for ways to miniaturize all manner of devices, too.

"Over the decades, hundreds of millions of dollars have been invested into MEMS companies. With limited success, 'MEMS' can be a scary word, as the number of successful MEMS products to date can be counted on two hands," said Dhillon. "Although we make microelectromechanical systems, we do not build them the same way and thus do not possess the same challenges traditional MEMS companies face. It is one of the reasons we emphasize that we are systems beyond silicon. In fact, almost all of the devices we develop don't use any silicon at all!"

Integra Devices has compiled industry estimates for the total available market for industrial components and mechanical

devices to be greater than \$200 billion. That being said, the existing MEMS industry has only managed to miniaturize about 10 percent of that market.

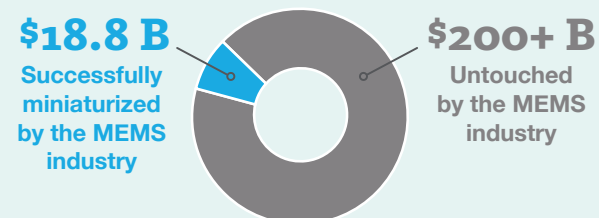
"There's a big piece of the pie that has yet to be miniaturized and that's what we are aiming at," said Sourabh Dhillon, business development manager at Integra Devices. "We don't look to compete with what's already been miniaturized, like accelerometers, microphones or gyroscopes; those have already been miniaturized successfully. Integra Devices is going to build the devices that the industry could not."



THERE'S A BIG PIECE OF THE PIE THAT HAS YET TO BE MINIATURIZED AND THAT'S WHAT WE ARE AIMING AT."

— Sourabh Dhillon

Total Available Market for Industrial Components & Mechanical Devices (Sensors, Relays, Millimeter-Wave Devices, Energy Harvesters)



Sensors: BCC research 2017; Relays: Transparency market research 2016; Mm-Wave Devices: markets and markets 2017; Energy Harvesters: BCC research 2017

MAKING CONNECTIONS

The first product that Integra Devices developed and miniaturized was a high-performing electromechanical relay for microwave – or millimeter-wave – frequencies, a long sought-after device in the MEMS industry. This relay caught the attention of Lockheed Martin, a global aerospace and defense company with worldwide interests, who became their first customer, allowing Integra Devices to be customer-funded from an early stage – a rarity in the startup space.

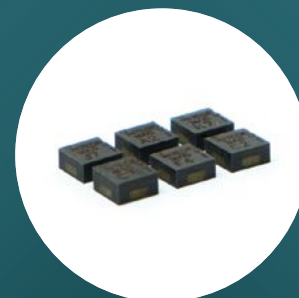
Electromechanical relays – or switches – control radio frequency signals and are mainly used for communications technologies, like fifth-generation (5G) communication networks, whose faster connection is made possible by transmitting at higher frequencies than previously used. The problem Integra Devices aims to solve with their millimeter-wave relay comes with the nature of higher frequency transmission.

Higher frequencies cannot go through solid structures, like walls or buildings, as easily as lower

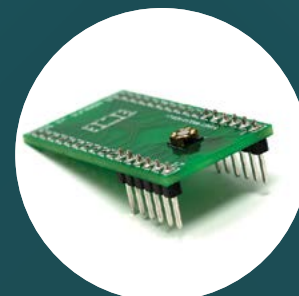
The Integra Devices team tests micro-devices in their lab.



The eyelash-size, battery-free, biocompatible pressure sensor to measure pressure in the eye.



A high-performing microelectromechanical relay was a long sought-after device in the MEMS industry. Integra Devices' micro-relays are measured in millimeters instead of inches.



One of Integra Devices' micro-relays on a printed circuit board.

frequencies and they have a limited range. This means that there needs to be a larger infrastructure than previous-generation technologies and, therefore, more cellular base stations closer together.

Integra Devices' micro-relay can be manufactured much more cost-effectively than existing relays and is physically smaller – measured in millimeters instead of inches – all without any loss in performance. This puts Integra Devices in a well-suited position to help speed the adoption of 5G, in addition to advancing other industries in need of miniaturized solutions.

MINIATURIZING TODAY FOR A GRAND TOMORROW

Having unlocked the secret to miniaturizing devices, Integra Devices has been busy perfecting their relay and a number of other devices. A glaucoma stent company contracted the startup to develop an eyelash-size, battery-free, biocompatible pressure sensor to measure pressure in the eye. Another pressure sensor Integra Devices is working on for drug delivery aims to ensure proper doses are being administered by monitoring for blockages or leakages in the delivery system, allowing at-home chemotherapy.

They built prototypes of Proof of Product (POP) Grants* award winner Dr. Hamid Djalilian's new hearing aid, which uses an actuator that sits on the tympanic membrane to mechanically move the eardrum and create sound. They are also developing an energy-harvesting device that uses machine vibrations to power the next generation of Industrial Internet of Things devices – which will eliminate the need for batteries in devices used in monitoring and data collection – after they received a grant from the National Science Foundation*.

Despite all of these new micro-devices and applications, Integra Devices maintains their primary focus on commercializing their micro-relay. From there, the startup aims to become a household name in industrial and life science components, much like General Electric, Siemens and Bosch, who build components for everything from consumer electronics to military applications. Integra Devices' new paradigm in micro-device manufacturing and their appetite for innovation has the potential to take them there.

Learn more about how Integra Devices is miniaturizing the world around us by visiting integradevices.com ///

*Resources Mentioned in this Story

Proof of Product Grants
innovation.uci.edu/programs/pop-grants

National Science Foundation
nsf.org

E•LEC•TRO•ME•CHAN•I•CAL RE•LAYS / noun

electrically operated switches that control high-power electrical devices commonly used in aviation, aerospace and wireless technology industries

DEEP DIVE

From Rock Stars to Education

THOMPSON IS BRINGING HER A-GAME

BEING ABLE TO RIDE THE WAVE AND NOT FIGHT AGAINST THE TIDE, SIMPLY LETTING IT TAKE HER IN AND OUT, IS SOMETHING THAT HANNAH THOMPSON, DIRECTOR OF COMMUNICATIONS AT LEARNING OVATIONS, HAS LEARNED TO DO.

Learning Oventions, a Cove @ UCI Applied Innovation tenant, is an organization that deploys the A2i Professional Support System, a combination of technology and professional development that empowers teachers to successfully tailor instruction for students in kindergarten through third grade.

Thompson's entrepreneurial spirit fits right into the Cove ecosystem and is something, she believes, she inherited from her ancestors. Starting with her family in Japan, Thompson comes from an entrepreneurial background – her grandmother's family owns a bakery with more than 100 stores and her grandmother herself ran a seamstress business. These examples have served as the source of inspiration for Thompson's pursuit in entrepreneurship and has motivated her to lean into what she is good at and led her to Learning Oventions.

Brought on board by Jay Connor, CEO of Learning Oventions, Thompson is responsible



IT'S NOT JUST ABOUT THE CHILDREN ... IT'S ABOUT REALLY SOLVING SOCIETY'S PROBLEMS."

– Hannah Thompson

for all Learning Oventions' branding, including marketing, communications, graphic design, social media and event planning.

"I thrive in the startup environment," said Thompson. "I have a passion for entrepreneurship and I really thought it'd be an amazing opportunity but also because they're doing social good."

As a mother of two, Thompson resonates with Learning Ovation's drive to increase the literacy rate in young children.



23%

of below-basic readers do NOT graduate high school.

In fourth grade there's a transition where it becomes reading to learn not learning to read. According to the National Conference of State Legislatures, 23 percent of below-basic readers do not graduate high school.

Learning Oventions ensures that all children are reading at or above grade level by the end of third grade. The students are given an assessment test through which the results are broken down by the

type and amount of instruction that the student needs. This information is then shared with their teacher who receives a lesson plan based on the individual students' needs.

"We're changing the world because it's not just about the children, it's about long-term outcomes and it's about really solving society's problems," said Thompson.

This passion for startups and people has allowed Thompson to work in exciting

environments, meet the right people and establish relationships. She rubbed elbows with Gene Simmons (see picture) and Paul Stanley of KISS while helping to launch Simmons' first few restaurants, Rock and Brews. She also worked as a staff member in the communications and marketing department at Chapman University where she led content marketing efforts for the Argyos School of Business and Economics.



Hannah Thompson, marketing director at Learning Oventions, and Gene Simmons, co-lead singer and bassist of KISS, at NBC Studios in Burbank, California.

And, in addition to her position at Learning Oventions, her love of education and experience is what brought her to The Paul Merage School of Business* as assistant director at The Beall Center*, where she helped launch a Master's program in Innovation and Entrepreneurship*. The program is the first of its kind in the UC system and will begin instruction this fall.

"I hope one day my husband and kids will look at some of my accomplishments and be proud," said Thompson. ///



Learning Oventions' technology aims to increase the literacy rate among young children. Students are given an assessment test, which ultimately tailors their learning experience.

*Resources Mentioned in this Story

Paul Merage School of Business
merage.uci.edu

Beall Center
beallcenter.uci.edu

Master's program in Innovation and Entrepreneurship
merage.uci.edu/programs/masters

TEXT BY: JENNY GARCIA / PHOTOS BY: EMILY MORRISON, JULIE KENNEDY, AND PROVIDED BY HANNAH THOMPSON

Four Decisions Made by Entrepreneurs that Led to Success

COVE GRADUATES EXPLAIN MONUMENTAL CHOICES THAT HELPED THEIR TEAMS IN THEIR STARTUP JOURNEYS.

Although the UCI Applied Innovation website often mentions new technologies and entrepreneurs currently housed at the facility, there are many startups that began here that have grown and moved on to bigger adventures. Here, a few alumni pinpoint certain decisions they made that they credit with their entrepreneurial success.

TEXT BY: GRACE WOOD PHOTO BY: JACQUELINE KAO

*Resources Mentioned in this Story

Cove @ UCI Applied Innovation
innovation.uci.edu/the-cove

I-Corps
innovation.uci.edu/programs/i-corps



“

“I HIRE FOR DIVERSITY, AND I MEAN THIS IN A LOT OF WAYS, NOT JUST GENDER, ETHNICITY, ETC.”

– Gillian Hayes / AVIAA

“

“YOU REALLY NEED UNIQUE CLINICAL INSIGHTS AND SAY, ‘HOW CAN I APPLY MY PRODUCT SO THAT IT CAN REALLY MAKE CLINICIANS SAY I NEED THIS, I WANT THIS TO HELP MY JOB AND HELP MY PATIENTS.’”

– Byron Shen / Velox Biosystems

“

“OUR BEST STARTUP DECISION WAS JOINING AN INCUBATOR/ACCELERATOR.”

– Vijay Dhaka / INBRACE

“

“FROM MY PERSPECTIVE, THE BEST BUSINESS DECISION THAT WE WERE ACTUALLY TAUGHT IN OUR I-CORPS PROGRAM WAS GETTING OFF CAMPUS.”

– Will Amos and Aldrin Lupisan / Closed Loop Plastics

Hayes, a UCI informatics professor turned CEO of AVIAA, an international group purchasing organization for business aviation, actively hires employees with diverse career backgrounds, spanning across industries like consulting, tech, hospitality and finance. This strategic maneuver means more input from a variety of sources and industries that ultimately informs how Hayes approaches AVIAA. Essentially, employees with a wide variety of career experiences contribute to her company.

Shen, Velox Biosystems CEO, believes that bringing different perspectives together, such as those of clinicians and patients, aided Velox Biosystems’ growth in the biomedical industry. As a team that creates technology to detect various health issues, Shen and his team design products with clinical practice and outcome in mind. He considers how doctors will apply the technology in their clinical decision-making algorithms to better diagnose and treat patients, which gives the team a holistic view of medical devices that extends from conception to development.

The Cove @ UCI Applied Innovation* served as an incubator, which empowered Dhaka, chief business officer, to focus on team development without the stress of office management for INBRACE, a medtech startup reinventing orthodontic treatment with invisible Smartwire® technology. This atmosphere helped establish a formidable support system and trusting relationships between workers. The Cove’s resources taught the INBRACE team how to speak with investors and gain more traction economically. With a strong team and informed business style, INBRACE has the foundation to provide innovative dental braces on a large scale.

Amos, a UCI alumnus and co-CEO of Closed Loop Plastics, which specializes in recycled filament for 3D printers, utilized the programs and workshops available at Applied Innovation, such as the I-Corps program*, a National Science Foundation funded grant program to train entrepreneurs. However, he also recommends stepping out of the “safety bubble” of one’s immediate community. By asking people outside of UCI about sustainable 3D printing, Amos learned about the need for recycled filament on a larger scale. With access to more perspectives, Amos tailored his product to reach a more expansive base.

Applied Innovation provides services to a diverse range of startup companies, many that have progressed beyond the incubator in various ways. Each startups’ successful experiences lie within their use of Applied Innovation’s resources – from Innovation Advisors to the collaborative space. ///

Build your own success story and check out Applied Innovation’s programs to help move your startup to the next level
innovation.uci.edu/programs

COVE TENANTS

In the Ecosystem

RESIDENTS OF THE COVE @ UCI
APPLIED INNOVATION AT A GLANCE.

Docbot

Docbot received a National Science Foundation-funded SBIR for \$225,000. The team plans to use this toward advancement of care for patients with Barrett's Esophagus, a serious complication of gastroesophageal reflux disease (GERD).

Laser Associated Sciences (LAS)

LAS has received FDA 510(k) clearance on their first product, the FlowMet-R, which uses laser technology to measure peripheral blood flow noninvasively and in real time.

SBDC @ UCI Applied Innovation

On June 3, the three SBDCtech service centers of the OCIE SBDC Network will present the first ever Women Talk Tech Forum at the Cove @ UCI Applied Innovation. This is an event for women entrepreneurs in the fields of high-technology and life sciences to discuss leadership, scaling ventures, trends, business growth, funding and more.

Sustain SoCal

On June 25, Sustain SoCal will be hosting their renowned advanced transportation conference at the Cove @ UCI Applied Innovation. The event, now in its sixth year, will offer an overview of innovative solutions to the region's most pressing transportation issues.

Executive Next Practices

On June 13, the ENP Institute, NextWorks Strategy and Indie Books International will present the 2019 Growth U Summit at the Cove @ UCI Applied Innovation, where attendees will learn how to achieve key platform and revenue leaps, build and leverage strategic alliances and craft a renewed purpose and brand refresh.

Learning Ovations

From July 8-12, Jay Connor and UCI Chancellor's Professor at the School of Education Carol Connor will share the story of Learning Ovations, the research behind their A2i Professional Support System and provide training at the Cove @ UCI Applied Innovation.

Base 11

Base 11 announces the Next Frontier Tour being held in June, featuring former astronaut Leland Melvin. The tour is designed to help attendees learn about the Next Frontier economies, and why their success hinges on diversity.



COVE TENANTS

AG Tools
Auctus Global Capital
Base 11
Beckman Coulter
Brightlands Maastricht
Health Campus
Capillary Biomedical
Cove Fund
Cove Fund II
Docbot
Executive Next Practices
Gate 5 Energy Partners
GreenTech California
Hamamatsu
JeniVision
Kadho
Kolkin
Laser Associated Sciences
Learning Ovations
Lextrum, Inc.
Mark IV Capital
METaseismic
Monet Networks
New Enterprise Associates
Nexus Optical
Novoheart
NXT Biomedical
OCTANe
Polgenix
RebeccaTech
RTConfidence
SAP Innovation Center
SBDC @ UCI
Applied Innovation
Sustain Southern California
Syntr
Tech Coast Angels

For more information on community partners, visit:
innovation.uci.edu/the-cove/ecosystem



UCI APPLIED INNOVATION
EMPLOYEE FEATURE

with Ron King

UCI APPLIED INNOVATION SAT DOWN WITH RON KING TO LEARN ABOUT FUTURE TRAVEL PLANS AND WHO INSPIRES HIM.

Ron King is the associate director for Faculty Innovation and Entrepreneurship at UCI Applied Innovation. King helps faculty develop commercialization plans for their technologies and teaches engineering students about commercialization. From dressing up his dog for Halloween, to carnival food, King offers a glimpse into his personal life.

Q Place you most want to travel to?

Actually, I'd like to visit all the states I've never been to here in the United States – it's a lot. Next on my list is Vermont during the fall to see the leaves and enjoy the maple syrup. I just discovered maple syrup thanks to my dog Maple.

Q Favorite Halloween Costume?

My favorite Halloween costume, which actually wasn't for me, was the one for my dog. We dressed her up as Cerberus last Halloween. Cerberus was the dog that guards the gates of hell and so it's the three-headed dog that looks like a really vicious pit bull. My dog's a pit bull so I actually gave her two more heads.

Q What's your favorite carnival food?

I think it's still corn dogs.

Q Who inspires you?

It's a combination of people, but of course, my parents above and beyond everyone. Another inspiration has been George Washington Carver. There is also Benjamin Banneker, an African American born in 1731 as a free man – not a slave – who owned his own farm in Baltimore. He was largely self-taught but considered a genius. He was a mathematician, astronomer, inventor, author and a surveyor. He did the surveying of the District of Columbia and laid out the site of the congressional buildings, the National Mall and the White House.

Q The Godfather or Star Wars?

Godfather. It was a close call but the Godfather reminded me of some people I know from my old neighborhood. ///

TEXT BY: JENNY GARCIA / PHOTO BY: YUXIN CHA

Across Campus

SOME OF THE LATEST STORIES
FROM THE UCI CAMPUS



SCHOOL OF SOCIAL SCIENCES

UCI researchers are conducting a study with five popular financial technology apps to determine if they are actually teaching Americans about better financial habits. The study is also determining how Americans interact with these apps.

socsci.uci.edu



DONALD BREN SCHOOL OF INFORMATION & COMPUTER SCIENCES

Assistant Professor of Computer Science Ardan Amiri Sani recently received a National Science Foundation (NSF) CAREER award for his research on “Securing Mobile Devices by Hardening their System Software.”

ics.uci.edu



HENRY SAMUELI SCHOOL OF ENGINEERING

Kyriacos Athanasiou, UCI distinguished professor of biomedical engineering, examines the causes of temporomandibular disorders, past failures in treating them, and new approaches based on tissue-engineering innovations developed in his laboratory.

engineering.uci.edu



PAUL MERAGE SCHOOL OF BUSINESS

The Merage School designed a nine-month, full-time accelerated master’s degree to ensure it provides graduates the tools and connections they need to launch successful startups or to grow at established companies by applying innovative “intrapreneurial” strategies.

merage.uci.edu



UCI PHARMACEUTICAL SCIENCES

The American Cancer Society awards \$660,000 to Claudia Benavente, assistant professor of pharmaceutical sciences and developmental and cell biology. Benavente’s research aims to explain a potential therapeutic target for the treatment of osteosarcoma, a childhood cancer of the bone.

pharmsci.uci.edu

TIPS

How to Pitch to Investors, Part 3: Refine Your Pitch

PART THREE OF A THREE-PART SERIES FOCUSING ON LESSONS
I HAVE LEARNED ALONG MY ENTREPRENEURIAL JOURNEY.

Pitching to investors can be a hair-raising experience since many entrepreneurs think it is their only shot. Often, angel investors will let an entrepreneur pitch a second time after a 6- to 18-month time period if the startup has met milestones, made traction or improved the business model.

Think of pitching to investors as an important opening conversation. Typically, the CEO and founder should present. A good presentation by the founder is often more effective than a great presentation from the marketing person who is not a founder. Two or, at most, three people may present if the expertise lies within the different role or responsibility. A good CEO should still know the key numbers, such as cost of product, gross profit, revenue and cash flow. Investors want to know the CEO can present to customers in a reasonable fashion as they are looking for passion, leadership and being genuine.

It is important to remember that no matter how interesting the technology or service is, it has to solve a business problem that people are willing to pay for. Avoid being wrapped up in the technology or service itself and focus on how it can create profitable and sustainable revenue. Investors get excited if the product or service does something faster, cheaper or better. However, it is important that it’s not just better, but significantly better – such as 50 percent the cost – or much faster. It also needs to solve a big pain point – there needs to be a big market potential.

When you pitch to investors, they do not see any return until you sell the company or do an initial public offering. Therefore, investors will also want to know that your company will attract acquisition. Be sure to show investors a way they will eventually get a return on their investment, such as likely acquirers and examples of similar acquisitions.

As I previously covered, investors are looking for entrepreneurs who show passion, are genuine, and are coachable. If your startup is in the very early stage, explain what the team will look like after funding. Nothing scares an investor away quicker than someone who appears untrustworthy.

After the presentation, there will often be a 10- to 20-minute question and answer portion, which is a crucial time for the entrepreneur. Investors are not only looking for what your answers to their questions will be, but also they are interested in how you answer them. There are a few sure-fire ways to be rejected during this time:

1 ARROGANCE IS RARELY TOLERATED

It creates the impression of insecurity and a potential perception of a CEO who may not listen to feedback.

2 NOT ANSWERING WHAT INVESTORS ASK

If you don’t know, say you don’t know. Pay attention to the question, and answer the question asked.

3 ARGUING WITH THE INVESTORS

It is fine not to agree, but how you handle conflict and pressure in this situation is a reflection of how you will handle pressure as the CEO.

Follow up some of your answers with “Did I answer your question?” This will show the investor you are thoughtfully responding to their question. Remember: pitching comes down to communicating a plausible business plan with passion. Do your homework, be prepared, listen and show investors you are the entrepreneur to make this company scale and be a big success. ///

TEXT BY: RICHARD SUDEK, PH.D. / PHOTO BY: YUXIN CHA
Find me on social media: @RichardSudek

“DO YOUR HOMEWORK,
BE PREPARED, LISTEN AND
SHOW INVESTORS YOU ARE
THE ENTREPRENEUR TO
MAKE THIS COMPANY SCALE
AND BE A BIG SUCCESS.”
– Richard Sudek, Ph.D.



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innovation.uci.edu/support-innovation

UCI Applied Innovation is a dynamic, innovative central platform for the UCI campus, entrepreneurs, inventors, the business community and investors to collaborate and move UCI research from lab to market.

WAYS TO GET INVOLVED

innovation.uci.edu/get-involved

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