

IOWA ENGINEER



THE UNIVERSITY OF IOWA COLLEGE OF ENGINEERING

Volume 2017 | Number 2

It's like
riding a
bike...

*ENGINEERING
REALITY FROM
WISHES*



“I just wa

Greetings from Iowa City during what promises to be a very eventful summer of 2017! The “substantial completion” of our new building addition is scheduled for August, therefore we will expand into the new 65,000 square foot, state-of-the-art facility shortly thereafter. Our faculty and staff have done an amazing job accommodating our record enrollments and research programs in our current space, however we eagerly await the completion of the addition since it will further enhance the excellence of our teaching, research, and service activities.



This edition of *Iowa Engineer* provides more examples of what makes our college unique and exceptional. On the alumni front, there is a great article about the four Knake sisters who have all graduated from the University of Iowa College of Engineering. The accounts of their career paths illustrate the amazing students that we attract, while the theme of multiple siblings from one family attending our college is

something that we see time and again. This edition also includes a fascinating account of how Kari Kozak, head of the Lichtenberger Engineering Library, encourages our students to develop their creativity by providing a collaborative “maker space” that resides amongst the stacks of the more traditional library facilities. Finally, one of the research projects of Fatima Toor, a recent hire in Electrical and Computer Engineering is highlighted in this issue. You will be amazed when you read about her new cancer-detection device made up of nanowires, computer chips, antibodies, etc.

Enjoy another great issue of *Iowa Engineer*, and please, come to campus in the fall to see our exciting new facilities!

Alec Scranton
Dean of Engineering

Inside this issue of *Iowa Engineer*:

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On the cover: Jonny Cole smiles as he tests out the assistive device that allows him to better ride a bicycle.

*Alicia Truka and Mitch Miller discuss design changes with Jonny Cole.
Photos by Kirk Murray*

nt to ride my bike.”



ENGINEERING STUDENTS HELP TURN WISH INTO REALITY

TEXT BY LYNN ANDERSON DAVY

Eight-year-old Jonny Cole had a wish. Like most kids his age, he dreamed of riding his bike—a red motocross model with a Spiderman bell—around his Cedar Rapids, Iowa, neighborhood and on the bike path with his family.

But Jonny’s wish wasn’t as simple as it sounds. A congenital amputee, he was born without most of his right arm, the result of amniotic band syndrome, a rare birth defect caused when strands of tissue from the amniotic sac wrap around a baby’s finger, hand, arm, or leg, cutting off circulation and stunting development.

Jonny’s father, who felt helpless watching his son try to master the bike—riding it with one hand and missing tight turns again and again—decided to find a solution. At the time, Douglas Cole was a graduate student studying linguistics at the University of Iowa, and he didn’t have to look far for an answer.

“As a dad, you want to find a solution; you want to help (your child) as much as you can,” says Cole, who graduated from the UI with a PhD in linguistics in 2016. “So, I went to the College of Engineering’s machine shop.”

From there, Cole was quickly directed to the biomedical engineering department—specifically to the experts in diagnostic and therapeutic

health care device design. There, UI seniors complete a two-semester design project during their final year, and at the beginning of the year are presented with a list of possibilities. This year, one of the projects was Jonny's.

Biomedical engineering students Mitchell Miller, Kylie Hershberger, Nate Witt, and Alicia Truka jumped at the chance to work with the boy and quickly became close friends of the family.

"All four of us put Jonny's project down as our No. 1 choice," says Hershberger, a senior from Bettendorf, Iowa. Although the four students were not friends before the project, she says they quickly grew close because they "wanted to work with Jonny and wanted the same end goal."

Once they'd been assigned the project—nicknamed Jonny and the Flamethrowers—the students got busy setting up meetings with Jonny and his father and commencing the design process. At one of their first meetings, as the students were trying to get an idea of what Jonny wanted his device to do and how he wanted it to look, they were surprised by his laser focus.

"We were asking him all these questions and he just looked at us and said, 'I just want to ride my bike,'" says Truka, a senior from Mason City, Iowa.

Meetings with Jonny took place on Monday afternoons, a time that fit into the second-grader's school day and his father's academic schedule. During those meetings, a friendly bond developed between the boy and the students. Sure, they had work to do, measurements to take, and questions to ask, but there was also time for games of hide-and-seek, tag, and frequent high-fives.

During the winter months, when freezing temperatures made it impossible to practice bike riding outside, the students brought Jonny and his red bike into the Seamans Center for the Engineering Arts and Sciences. On the center's fourth floor, hallways became Jonny's personal velodrome.

Although some early models of the arm device broke, the students eventually found a combination of metal and plastic that was sturdy enough to hold up to the vitality of an 8-year-old while not being too cumbersome or uncomfortable. Jonny was clear with the students that he didn't want a prosthetic, an appendage that would attach to his body.



"We had to create something that bridged the space between [Jonny] and his bike's handlebars. One of the big things for him was that he didn't want something that attached to him, and we decided that was a safety issue too, in case he fell."

MITCHELL MILLER, BIOMEDICAL ENGINEERING STUDENT



“We had to create something that bridged the space between him and his bike’s handlebars,” says Miller, a senior from Dubuque, Iowa. “One of the big things for him was that he didn’t want something that attached to him, and we decided that was a safety issue too, in case he fell.”

The final device is about the same length as a child’s arm and includes a clamp that attaches to the bike’s handlebars, a flexible elbow piece, and a small cup, into which Jonny places his right arm. Inside the cup is some light padding for comfort.

“The first time we showed him the cup, he immediately stuck his arm in it,” says Hershberger. “That’s how we knew we had the right concept.”

After a year of work, the students met with Jonny during the week of April 24 to make final adjustments to the device and to practice riding the bike one last time. As the students watched Jonny happily pedaling around a small park on campus—a gleeful grin stretching across his face—they commented on his newfound ease.

Although he still uses training wheels, Jonny’s control of the bike is much better than it was when the design process started. And those tight turns? They’re not such a big deal anymore.

“When I ride my bike, I feel more stable and it’s easier,” says Jonny, who wanted to demonstrate the device and introduce his new buddies to his teacher and classmates before the end of the school year.

“He is so much happier and confident on his bike,” says Hershberger. “At first, he didn’t even want to be on the bike. We had to bribe him to even make a few laps on his own. Now he goes so fast, we can’t even keep up.”

On April 28, Hershberger and her teammates presented the device to a panel of judges at the Biomedical Engineering Design Day at the Iowa Memorial Union, and they said there was a hint of melancholy as the project ended. Though the students say they’re happy with the finished device—the design for which they plan to make available to other amputees—they admit they’ll miss Mondays with Jonny.

As for Jonny’s dad, he says he couldn’t be more proud of his son or more pleased with the work of the biomedical engineering students.

“They’ve been wonderful about involving Jonny in the design process and teaching him how to solve problems using technology,” says Cole, who is now a visiting assistant professor at the UI. “In my mind, they went above and beyond. We are so grateful for everything they did.”

Says Hershberger: “We’re just Hawkeyes helping another Hawkeye.” ■

All in the

TEXT BY SUSAN SHULLAW

Is there an engineering gene?

Some family trees seem to produce multiple engineering graduates. Leafing through the College of Engineering pages in old Hawkeye yearbooks, it's not uncommon to see last names repeating – fathers and sons, uncles and nephews, cousins and brothers.

And then there are the Knake sisters.

- Kami earned her B.S.E. in electrical engineering from the UI in 1999
- Trisha followed close behind, with a B.S.E. in electrical engineering in 2000
- Lindsey earned her B.S.E. in biomedical engineering in 2011
- Mollie graduated in 2016, also with a B.S.E. in biomedical engineering

Their mother, Kathy Knake, thinks she knows why her daughters gravitated toward engineering. She and her husband, Mike, and their families own Knake Farms near Bellevue, Iowa. The four Knake sisters – along with their “double cousin” Tara Knake Rossman (their mothers were sisters and their fathers were brothers), who earned her B.S.E. from the UI in 2001 – were part of a close-knit clan accustomed to hardship and hard work.

“Our two older girls, especially, remembered the difficulties we faced during the farm crisis in the 1980s,” Kathy explains. “That experience made them look for careers with good-paying jobs. Their dad studied accounting in college and they were all good at math and science, so engineering was a logical direction. And since we’ve always been Hawkeye fans, the UI College of Engineering was the obvious choice.”

Yet few of the Knake sisters – all highly successful – have pursued what might be described as traditional engineering careers.



The Knake sisters, anticipating a Hawkeye win at Kinnick Stadium.

family



“Mom liked to remind me that my older sisters got scholarships, and since I had the same genes, I could do that too.”

LINDSEY KNAKE (BSE 2011)



FROM MUSIC TO MANAGEMENT

Kami, the eldest, says that when she began thinking about college, “I just wanted to pick the most stable route. There were lots of good jobs and not many women in engineering, which drew me to the field. But I never stopped to ask what would make me truly happy.” As it turns out, her real passion was music. Much to her parents’ dismay, she headed to Hollywood shortly after graduation.

“Engineering teaches you that you can teach yourself anything,” Kami says. “So, being a typical engineer and a good researcher, when I got to Los Angeles I bought a bunch of books about the music industry, figured out what I wanted to do, and started contacting everyone in the business until I got in the door.”

Eventually Kami landed a job at Warner Brothers. She credits her electrical engineering degree for her insights into computer technology and electronic media. After seven years of promoting big-name acts in LA, she relocated to Nashville. Today she’s an independent consultant there, helping to market a wide variety of bands and music companies. Podcasts from her “Bands Under the Radar” blog and website have been downloaded more than 4 million times.

If Kami’s career choice worried her parents, her sister Trisha’s more conventional path put them at ease – although it, too, led away from engineering.

“When I started at the UI, I didn’t know much about my career options,” Trisha recalls. “I was attracted to engineering because it was known to be difficult and I enjoy challenges. In college I had internships at Hewlett-Packard and UBS, and those experiences were extremely helpful in understanding what I could do with my degree.”

After graduation, Trisha joined an internet start-up as an application developer. She transitioned to Deutsche Bank as a project manager a few years later. In 2006, she made the move to UBS and is now a Managing Director and Head of Securities Backed Lending and Client Accounts for UBS Financial Services. She lives in New York with her husband and three young children. In 2012, she earned an MBA from NYU, and in 2014, was named UBS’s Working Mother of the Year.

Like her older sister, Trisha says her engineering degree taught her how to think – and perhaps how to pivot. “I believe a degree in engineering is a potential differentiator that helps you succeed in any industry.”

The sisters celebrate “Hawkeye style” at Lindsey’s wedding.

BLOSSOMING IN BIOMEDICINE

During the worst years of the farm crisis, Kathy worked a full-time job out of town and took college night classes. Then, as the economy recovered, the Knakes’ two younger daughters were born: Lindsey in 1989 and Mollie in 1994.

“Dad really was hoping for a boy when I came along. But I became ‘daughter number three,’ as he likes to call me. Sometimes I think it’s just easier for him to number us,” Lindsey laughs.

When it was time for college, Lindsey says her path was well marked. “Mom liked to remind me that my older sisters got scholarships, and since I had the same genes, I could do that too. I thought about doing pre-med instead, but then Trisha said, ‘if you’re smart enough to do engineering, you can do anything, medicine included.’ And that’s how I chose biomedical engineering.”

While at the UI, Lindsey worked in the lab of Professor Karim Abdel-Malek, who had taught her older sister. “He recognized my name when I interviewed for the job,” Lindsey recalls, “and he was a wonderful mentor to me.”

Lindsey also met her husband in the UI engineering lab. Today the couple lives in Houston, where Lindsey is in her second year of pediatric residency at the Baylor College of Medicine, working at Texas Children’s Hospital.

Youngest daughter Mollie earned her degree in biomedical engineering in 2016, a year after Lindsey graduated from the UI Carver College of Medicine. Although Mollie was intrigued by medicine, she says her impactful experiences during college led her to the medical device industry.

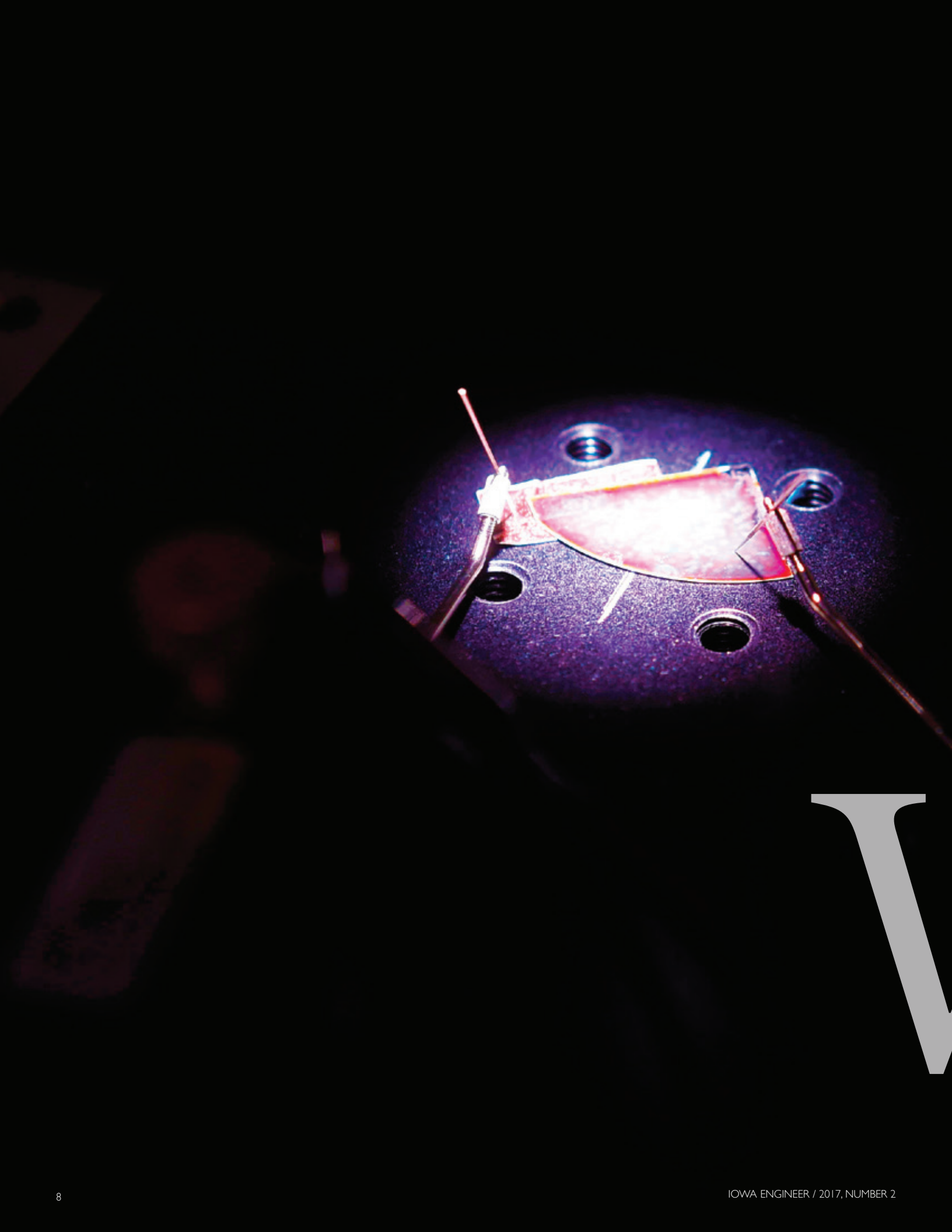
“Experiencing the product development process and learning to create effective presentations to communicate project updates in Senior Design is an opportunity most undergraduate students don’t get,” says Mollie. “This course, along with taking a semester off to do a co-op with Boston Scientific, played a huge role in landing the job I have today.”

Mollie is currently a Design Assurance Engineer with Medtronic in Minneapolis, where she provides design quality support for a new product targeting patients with venous obstructions. “I may not be a doctor like Lindsey,” she jokes, “but I like to say I’m the one saving lives behind the scenes, and that makes me excited to go to work every day.”


Excitement is another trait shared by the Knake clan—excitement about and passion for their work, for the sports and service projects they all make time to pursue, for their alma mater, and most of all, for one another.

“I think our story demonstrates the power of a supportive family,” says double-cousin Tara, now Commercial Manager for Caterpillar’s Job Site Solutions Division in Peoria, Illinois.

“We were lucky that even if we weren’t all related, we would have chosen to be friends.” ■



I



Working toward an innovative cancer detection device

TEXT BY GARY GALLUZZO

W

hat if a potentially painful biopsy could be replaced by a process in which a physician conducts a simple test — similar to turning a key in a lock — to learn whether a patient has a particular cancer, such as lung cancer?

In addition, what if the test were so sensitive that it could detect cancer earlier than conventional tests?

Those questions drive some of the research activities of Fatima Toor, assistant professor of electrical and computer engineering in the University of Iowa College of Engineering.

Spot light on solar screening device.

Toor says that the day-to-day experiences of her husband, a physician in the oncology department at the University of Iowa Hospitals and Clinics, also help to inspire her research. From him, she has learned that early detection of cancer may help reduce excessive patient worry and emotional distress.

“I want to enable early cancer detection and diagnostic techniques,” she says. “It is hard for my husband to tell a patient that they have only another six months or so to live. The worst news a patient can receive is: ‘You have cancer.’”

“Whatever we can do to address cancer diagnosis is good. I feel passionate about that,” says Toor, adding that one in every three people will likely get cancer sometime during their lives.

In order to understand why she uses light and electricity in her cancer detection process, it helps to know a little bit about her engineering background.

“My expertise has always been in nanowires, in optoelectronics, and in making things small. Also, my expertise is in generating, detecting or manipulating light,” says Toor, who received her undergraduate degree with a double major in physics and engineering science from Smith College and her master’s degree and doctorate, both in electrical engineering, from Princeton University. She and her husband have lived in Iowa City since 2014.

On the outside, Toor’s device is a compact, white plastic cartridge, roughly one inch square. A patient’s blood sample enters from one side, undergoes testing, then flows out the other side. Whether or not an electrical circuit is completed inside the plastic cartridge makes all the difference.

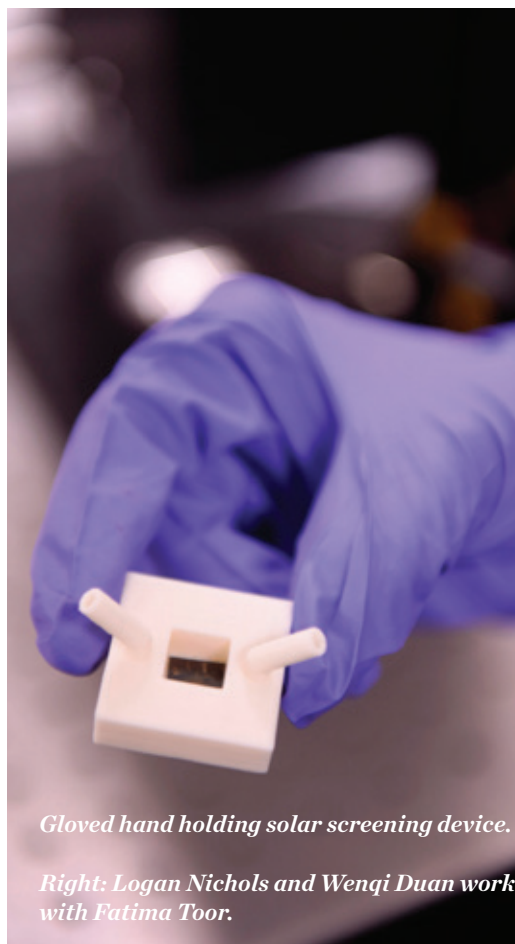
Here is how it works. The cartridge contains a solar cell covered with millions of gossamer-like nanowires, each of which is roughly 1,000 times thinner than a human hair. The nanowires are coated with antibodies for a particular cancer.

Antibodies — produced by plasma in the blood — are proteins that can bind to potentially harmful antigens, such as bacteria and viruses, and neutralize them. Thus, the antibody for a particular cancer represents the “lock” in the system.

The potential “key,” on the other hand, is represented by a specific antigen, such as a cancer cell, in a patient’s blood. If the blood sample contains cancer cells, then the antibodies will bind to the cancer cells like the fit between a lock and a key. Changes in the device’s electrical and optical output indicate the presence — or absence — of cancer cells.

“So, our device is kind of a lock-and-key device,” Toor says. “Our basic idea is to use millions of vertically oriented nanowires to detect cancer. In this project, I focus on sensing electrical signal changes due to the binding of cancer proteins. If we find that our nanowire sensor works, then our technology could be a cheap and effective way to detect whether someone has cancer or not.”

Toor and her fellow researchers are collaborating with Advanced Silicon Group (ASG), a company formed through UI College of Engineering research, on a \$225,000 National Science Foundation (NSF) Small Business Technology Transfer grant to develop a test for lung cancer.



Gloved hand holding solar screening device.

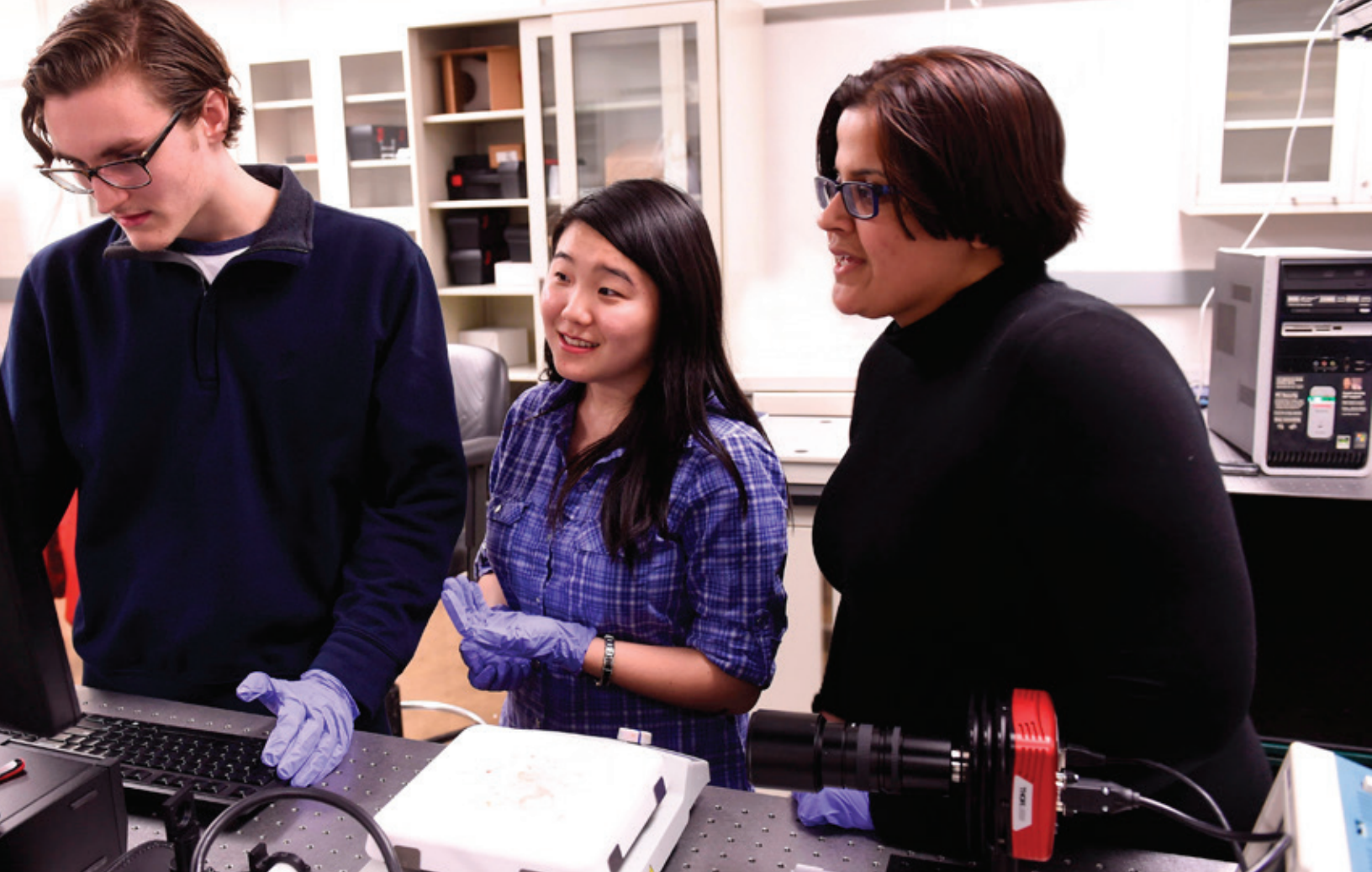
Right: Logan Nichols and Wenqi Duan work with Fatima Toor.

Currently, the device is in its proof-of-concept phase and is being used to test for prostate cancer. That means the nanowires are treated with antibodies for prostate specific antigen (PSA), a protein produced by the prostate gland. Nanowires treated with antibodies for PSA constitute the lock. When a patient’s blood sample containing antigens for PSA is introduced to the plastic cartridge, the “lock and key” are matched and a transfer of electrons produces a change in electrical current.

“We have demonstrated a proof-of-concept, where we have detected a strong electrical signal change with the functionalization of high concentration of PSA antigen on the nanowire sensor,” Toor says. “We need to demonstrate a signal change with smaller amounts, nanogram amounts, in order to have our device approved for clinical relevance. We next plan to do detection on the DNA level, as well.”

“Our current grant is for lung cancer because it is one of the most prevalent types of cancer. Later, we plan to test our sensor for various other deadly cancer types,” she says.

Aliasger Salem, professor of pharmaceuticals and translational therapeutics in the UI College of Pharmacy and biomedical nanotechnology expert, says that his research group is pleased to “attach the lock” and provide other expertise in the development of the cancer detection device. He also notes that lung cancer, a leading killer of both men and women, was responsible for some 1.6 million deaths worldwide in 2012



and has a five-year survival rate of less than 18 percent. The National Institutes of Health estimated that lung cancer cost the United States some \$12 billion in 2010.

“Early detection of cancer is critical for therapies to be effective,” says Salem. “Current tests need a significant volume of blood containing a large amount of cancer antigens or mutated DNA to adequately detect the presence of the cancer. The Toor group, the Salem group and ASG are working together collaboratively to develop a nanowire sensor that can detect cancer antigens and mutated DNA at much lower concentrations.

“My role in the project is functionalizing the nanowire arrays with receptors that will bind specifically to the cancer specific molecules and providing additional molecular and cancer biology expertise to the project as we develop the sensor,” he says.

Similarly, Wenqi Duan, student researcher in Toor’s lab and second-year graduate student in electrical engineering, plays an important role in the project as she prepares the “key” for the cancer detection device.

“I am very excited to be able to participate in this groundbreaking research project on developing a low-cost cancer detection sensor,” says Duan. “My research involves utilizing state-of-the-art microfabrication facilities at the University of Iowa Microfabrication Facility (UIMF) to create the sensor.

“We collaborate with Professor Salem to help with functionalization of the sensor with cancer antibodies and antigen. After the sensor is functionalized, I test the sensor in our lab for sensitivity utilizing electrical and optical testing techniques,” she says.

“It is really fulfilling being a part of this project, since anything that may result in better cancer detection will play a vital role in the future of cancer testing and treatment, and a great learning experience, as well,” Duan says.

Toor notes that related nanowire sensor research on cancer detection devices is being conducted at other research institutions, including Harvard University, but suggests that the greater sensitivity of her sensor will result in a superior cancer detection device. “We should have a more sensitive, affordable, and more effective device than Harvard,” she says.

“There is a need for low-cost diagnostics, doctors tell us, but we must focus on one or two cancers and demonstrate that our work is useful,” she says.

Looking into the future and apart from its potential impact on cancer detection, the diagnostic tool may have application in other areas, including water quality testing and toxic gas sensing.

“In summary, our device will be economical, sensitive and – I hope – able to detect cancer sooner rather than later,” she says. ■

Tools for tinkering

TEXT BY JEAN FLORMAN

For millennia, individuals with engineering minds have dramatically impacted the world, whether by erecting massive stone statues on Eastern Island, streamlining industrial production through “motion study,” or demonstrating the immense power of tiny transistors. During the last several decades, the development of engineering as a profession has accelerated and expanded, with the creation of whole new engineering sub-fields that leverage new tools and processes. New ideas have opened new opportunities for engineers with broad interests, expertise, and experience.

But regardless of time and change, one characteristic continues to define engineers: they love to tinker.

With the spring 2016 launch of the Creative Space, the Lichtenberger Engineering Library and the College of Engineering are now supporting that learn-by-doing approach in a new way.

“The Creative Space provides an opportunity for students to prompt their own hands-on learning,” says the Head of the Lichtenberger Engineering Library, Kari Kozak, who launched the space with an open house in September 2016. “We want students to come into the library and explore and play with the tools we offer.”

More than 150 tools, including calipers, digital scales, a triple beam balance, and more standard hand tools such as wrenches and a tape measure, are neatly catalogued and stored in drawers in a dedicated room behind the Engineering Library front desk. Kozak says the tool collection was jump-started in 2012 when Professor of Mechanical and Industrial Engineering Geb Thomas donated an array of “great tools” to the library. During the Creative Space’s inaugural year, the library added 96 new tools, and students checked out items from the collection more than 900 times.

“We have so many cool tools available,” Kozak says, “even a thermal imaging camera. And we’re adding more all the time.”

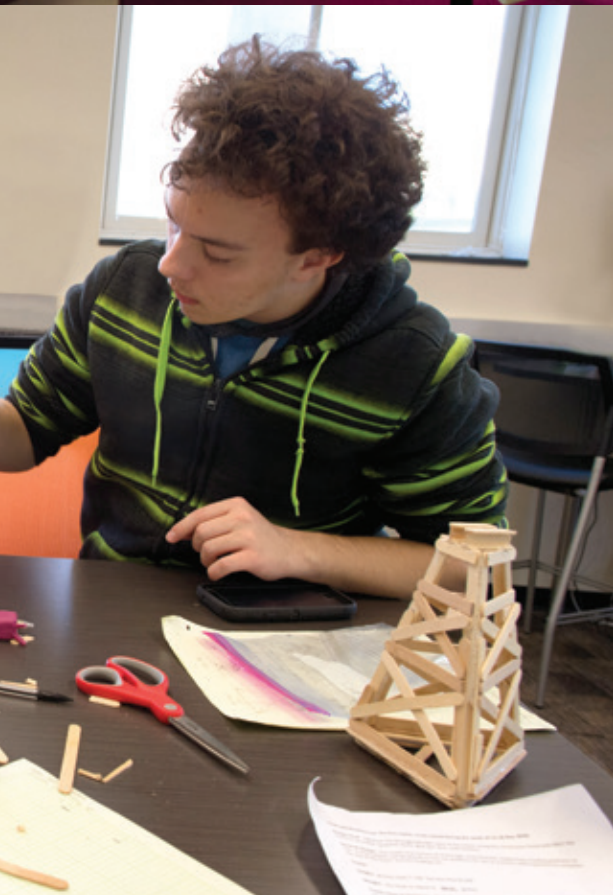
Among the more recent additions is a soldering iron, which Kozak says initially gave her pause because engineering students have been known to tinker in various places in the building, including classrooms and hallways. But she notes that faculty and library staff members encourage students to use tools in the right way, which includes considering the safety of themselves and others.



Students work on a project for their Engineering Program Solving class.



Kari Kozak and Kache Claytor test out the thermal imaging camera.



“The Create Space provides an opportunity for students to prompt their own hands-on learning. We want students to come into the library and explore and play with the tools we offer.”

KARI KOZAK, HEAD, LICHTENBERGER ENGINEERING LIBRARY

“Of course, the college’s machine and electronics shops have many of the larger machines that require more supervision and design help, as well as 3-D printers for prototyping,” says Kozak, who earned a Bachelor of Science degree in Meteorological and Environmental Studies and a Master’s degree in Library Science. “But the libraries wanted to add opportunities for students to have access to certain other tools, including those that could be checked out and used at home.”

The Creative Space now offers four different versions of 3-D scanners, three of which can be checked out for use at home. The library also provides an array of other digital tools, including a virtual reality (VR) RICOH Theta camera that captures and stitches together 360-degree panoramic images with one click of a button, and a 360Fly 4K camera that captures immersive video in both 360-degree horizontal and 240-degree vertical fields of view. For those who want an immersive 3-D experience, Oculus Rift headsets “translate” the images with precise tracking software and are available for use in the Creative Space.

While Oculus Rift headsets enable users to experience virtual or augmented reality by moving their heads and walking into the space, combining this headset with other equipment such as Leap Motion Controllers allow users to “enter” the alternative reality by actually moving objects through space. This has caused some amusing moments in the library when headset users have bumped into furniture—an issue the staff is trying to resolve through research.

For students to view and refine their skills capturing 3-D images and wielding the library’s extensive range of computer-aided design software, the Creative Space includes an actual—physical—space where students can explore, design, and create prototypes of their projects, solo or in collaboration with their peers.

The collaborative work area contains six computer stations and two four-person collaboration tables. The room adjoins the tool collection space, and offers two 43-inch computer monitors that can display a single image or four independent images. Whiteboards line the remaining wall space. At any given time, students can be found working individually at the computer station, solving problems at the whiteboards, or engaging in lively discussion around the tables. Often those discussions take place in a language other than English.



Redbot Robot.

Below: Calculations on the whiteboard.

One of the cleverest resources provided by the new engineering library center combines “old-school” tools such as hammers, wrenches, and wire cutters with the latest digital tools, including Arduino programming language boards, the credit-card-sized Raspberry Pi computer, and snap-together electronic littleBits modules that can be used to create robotics devices. Both digital and hand tools are combined in carefully curated sets called “Creative Boxes,” which enable users to do everything from playing Mario™ with a Play-Doh™ keyboard to creating e-textiles that sparkle and glow on command.

“The Creative Boxes are intended to encourage students to learn by playing around with the items we’ve put together in each box,” Kozak says. “The Creative Boxes are supposed to be fun, but they also help students learn by engineering solutions as well as coming up with new applications. We want students to use these resources to explore the engineering options they offer, and through experimentation, to even come up with larger projects.”

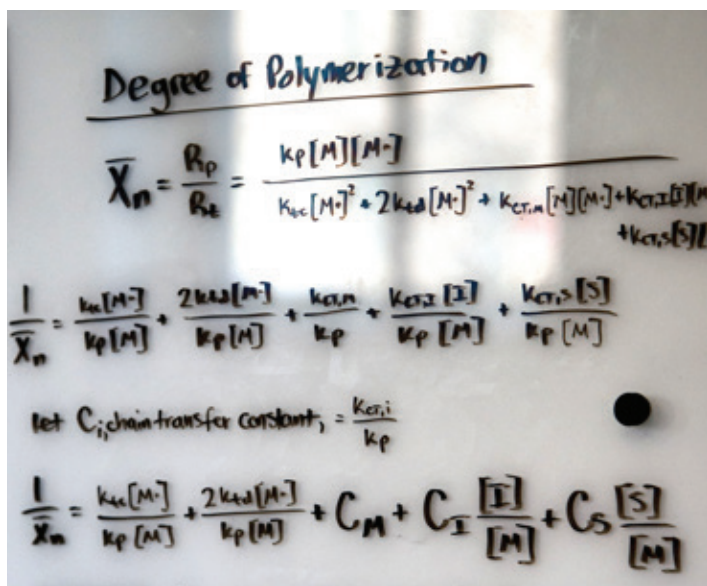
And, indeed, students are using the Creative Space resources to ask and answer intellectually intriguing questions, some of which may have practical implications. For instance, Salvador Rojas Murillo, a doctoral candidate in industrial engineering (human factors) is using Creative Space resources to explore the eye movements and brain function of individuals who are immersed in virtual reality.

To support this kind of innovative thinking and hands-on problem-solving, Kozak has launched Creative Space Kickstart, an annual competitive program co-sponsored by the Lichtenberger Engineering Library and the Engineering Technology Centers. The program offers up to 10 awards of \$500 to students who seek to prototype and possibly complete projects with help from the two engineering college service units.

“We’re really excited about this new opportunity,” Kozak says. “Of course, sometimes we can help get students started, but they may need additional funding to actually create and implement their ideas.”

Through funding, collections, and staff support, the Creative Space has proven to be a valuable and popular resource for students to connect with tools, information, and each other as they jumpstart the tinkering process.

Any UI student, faculty member, or staff member can check out Creative Space tools. Engineering alumni are welcome to drop in for a visit. ■



Degree of Polymerization

$$\bar{X}_n = \frac{R_p}{R_{te}} = \frac{k_p[M][M\cdot]}{k_{tc}[M\cdot]^2 + 2k_{td}[M\cdot]^2 + k_{ct,m}[M\cdot][M] + k_{ct,i}[M\cdot][I] + k_{ct,s}[M\cdot][S]}$$

$$\frac{1}{\bar{X}_n} = \frac{k_{tc}[M\cdot]}{k_p[M]} + \frac{2k_{td}[M\cdot]}{k_p[M]} + \frac{k_{ct,m}}{k_p} + \frac{k_{ct,i}[I]}{k_p[M]} + \frac{k_{ct,s}[S]}{k_p[M]}$$

let C_i chain transfer constant, $= \frac{k_{ct,i}}{k_p}$

$$\frac{1}{\bar{X}_n} = \frac{k_{tc}[M\cdot]}{k_p[M]} + \frac{2k_{td}[M\cdot]}{k_p[M]} + C_M + C_I \frac{[I]}{[M]} + C_S \frac{[S]}{[M]}$$

Dan Branson

1928–2017



Dan Branson, longtime professor of civil engineering (1963-1993) and member of the Legacy of Iowa Engineering passed away January 9, 2017 in Iowa City.

Branson was a concrete expert and his work on Deflections of Concrete Structures (the name of his McGraw-Hill book), is still being used and referenced throughout the world in building codes, standards and professional literature. He was an award-winning teacher, both within the university and nationally, having received the James M. Robbins National Excellence in Teaching Award from Chi Epsilon, the National Civil Engineering Honor Society.

Branson designed the pedestrian spiral ramp “Ribbon through Space” located at Burlington and Riverside Drive in Iowa City.

J. Richard Simon

1929–2017



J. Richard Simon, served the University of Iowa from 1957 until his retirement in 1999.

Simon was a professor of Psychology in the College of Liberal Arts and Sciences and Industrial Engineering in the College of Engineering.

His research on cognitive functioning resulted in the discovery of the “Simon Effect.” His research resulted in better emergency response procedures and reduced human error.

His courses focused on the application of psychology to organizations and the designing of work environments to promote greater satisfaction, safety and efficiency. During his lifetime, he established several scholarship funds supporting promising graduate students.

Forrest M. Holly

1946–2017



Forrest M. Holly joined the College of Engineering in 1982. His leadership roles in the College included Chair, Department of Civil and Environmental Engineering (1995-1999), associate dean for academic programs (1999-2002), and faculty research engineer at IIHR—Hydroscience & Engineering.

His areas of special research interest included computational hydraulics, dispersion in natural waters, alluvial-river processes, urban hydraulics, thermal discharges, and irrigation control systems.

He was active in the International Association for Hydro-Environment Engineering and Research (IAHR), and served in the roles of vice-president and president. IAHR honored Holly with the Arthur T. Ippen Award in 1983 and the Harold T. Schoemaker Award in 2001.

UPCOMING EVENTS

Engineering Fall Career Fair

September 28, 2017

11 a.m. – 5 p.m.

Iowa Memorial Union

Party after the Parade

Friday, October 6, 2017

6:30-8:30 p.m.

Seamans Center for the
Engineering Arts and Sciences

Homecoming Tailgate Open House Saturday, October 7, 2017

2.5 Hours Prior to Game
Time

Seamans Center for the
Engineering Arts and Sciences
Tour the new Seamans
Center Annex

Family Weekend Tailgate Open House Saturday, October 28, 2017

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Time

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Engineering Arts and Sciences
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VOLUNTEERS NEEDED

The College of Engineer seeks
volunteers to participate in
panel discussions over the
noon hour or late afternoon.

Panel discussion topics:

- My job as a (biomedical, chemical, etc.) engineer
- What I wish I knew before I started my job
- Reflections of a recent graduate

**If you would like to
participate, please
contact
wendy-brentner@
uiowa.edu**

Alumni in the News

Avery Bang (BSE 2007), CEO of Bridges to Prosperity, Denver, CO, was featured in the film “Dream Big: Engineering Our World.” The film was released February 17 in IMAX theaters across the country.

Gerald Beranek (BSE 2010), founder and CEO of BeraTek Industries, Cedar Rapids, was named Entrepreneur of the Year by the Corridor Business Journal.

Mark Fastabend (BSE 2000) has been selected as a member of the Emerging Leaders Class of 2017 of the Chicago Council on Global Affairs. He is general manager for a newly launched foodservice equipment division, Prince Castle, within the Marmon Group.

Jessie Huisinga (BSE 2004) assistant professor for the Human Performance Laboratory in the Landon Center on Aging, University of Kansas Medical Center, received the Distinguished Promising Professional Award from the College of Education, University of Nebraska, Omaha. Huisinga earned an MS (2007) in exercise science from the University of Nebraska at Omaha and a PhD (2010) in biomechanics from the University of Nebraska Medical Center.

Andrew Lambert (BSE 2007, MS 2010) is employed with the Lawrence Berkeley National Laboratory. His projects include working on scientific instruments for high-energy physics projects supported by the U.S. Department of Energy.

Marcelo Mena-Carrasco (MS 2003, PhD 2007) was appointed minister of the environment by Chilean President Michelle Bachelet.

Amanda (Ennis) Mikhail (BSE 1999) has been named administrator-research at Mayo Clinic, Rochester, MN. Mikhail will set strategy and further enable the translation of industry-leading discoveries, technologies and methods to the Mayo Clinic Practice and beyond. She will be supporting the research missions of Orthopedics, Physical Medicine and Rehabilitation, Sports Medicine, Endocrinology, The Rehabilitation Medicine Research Center, and The Robert and Arlene Kogod Center on Aging.

Dean’s Awards

Elizabeth Bernard (BSE 2000) received the College of Engineering Dean’s Award for Early Career Achievement on November 3. She is senior corporate counsel, litigation at Rimini Street. She previously served as litigation counsel for Google, partner at Kirkland & Ellis LLC, and as an associate at Darby & Darby. As part of her honor, she presented a seminar on “Practicing Law as an Engineer.”

Sharon K. Tinker (BSChE 1980) received the College of Engineering’s Dean’s Award for Distinguished Service on December 1, 2016. She is retired process safety engineer at ExxonMobil Research and Engineering Company, Baytown, TX. She is a member of the American Society of Chemical Engineers and currently serves on the Safety and Chemical Engineering Education (SACHE) Committee.

Alumni, Where Are They Now?

1970’s

Steve Sommermeyer (BSChE 1970) is second vice president, executive committee, board of directors of the Indianapolis 500 Oldtimers.

1980’S

Jeff DeGrange (BSE 1986), COO, Impossible Objects, LLC, was appointed to the Mechanical and Industrial Engineering Advisory Board.

1990’s

Chris Day (BSE 1991) of Stanley Consultants was appointed to the College of Engineering Advisory Board.

Robert (Bob) Pavlicek, P.E. (BSE 1988), was appointed manager of Terracon’s Eastern Operating Group, which spans from Maine to Florida and from Louisiana to the East Coast. Pavlicek joined Terracon in 1988 as a materials technician, and has since served as staff engineer, senior geotechnical engineer, geotechnical department manager, regional manager, and division manager. Terracon is a leading provider of environmental, facilities, geotechnical, and materials services.

Fitzgerald Steele (BSE 1997, MS 2000) was promoted to senior user experience researcher at Microsoft, Seattle, WA.

2000’s

Jennifer Bassik (BSE 2000) is director of product marketing for Centro, Inc., Chicago, IL.

Abbie Bys (BSE 2007) is product owner at Label Insight Incorporated, Chicago, IL. She oversees optimization of SaaS B2B platform providing CPG manufacturers and retailers the ability to unlock information & insights from Big Data around food labels.

Jaron Christoph (BSE 2002) was named Project Manager, Logistics at Rockwell Collins, Inc.

Timothy M. Evans (BSE 2002) is president/CEO of Athlete Web Design.

Lauren Gant (BSE 2006, MS 2008, PhD 2012), human factors and ergonomics manager, HNI Corporation, Muscatine, IA, delivered the 2017 Paul D. Scholz Symposium on Technology and its Role in Society on April 6. The title of her presentation was "Engineering in Ergonomics."

Andrew Gans (BSE 2008) is energy analyst at eSight Energy, Schaumburg, IL.

Justin Glasgow (BSE 2005, MS 2006) is hospitalist and quality improvement researcher at Christiana Care Health System, Wilmington, DE. He serves as director of District 3, Tau Beta Pi, National Engineering Honor Society, and serves as advisor for the Chapter and Association Financial Affairs Committee.

Allison Kerndt (BSE 2002) was named shareholder and attorney at Nyemaster Goode, P.C., Des Moines, IA.

Christian Kurasek (BSE 2003) was named Vice President at Guggenheim Securities, Guggenheim Partners.

Michael Lee (BSE 2008, MBA 2016) is a product manager with CIVCO Medical Solutions, Coralville, IA.

Thomas Metzger (BSE 2009), is a subsurface engineering specialist in the oil and gas industry in Abu Dhabi, United Arab Emirates.

Derrick Richmann (BSE 2007, MS 2011) was promoted to subcontract program manager, Rockwell Collins, Cedar Rapids, IA.

2010's

Bryan Peterson (BSE 2015, MS 2016) is a design engineer with RFA Engineering, Dubuque, IA.

Joseph Whitlock (BSE 2011) is program manager with Marquardt Switches, Inc., North America, Cazenovia, NY.

Murray S. Bicknell (BSME 1959) of Bettendorf, IA, July 12, 2015.

Alson D. Braley (BSME 1961) of Wingdale, NY, April 1, 2017.

Robert L. Brechwald (BSEE 1964) of Iowa City, April 11, 2017.

Robert E. Brown (BSEE 1965) of Oak Hill, VA, October 29, 2016.

Larry N. Bruce (MS 1966) of Garland, TX, November 15, 2016.

Ivan L. Burmeister (MS 1965) of Iowa City, IA, October 6, 2016.

Wallace W. Butler (BSEE 1942, MD 1948) of Las Vegas, NV, December 5, 2016.

Beth J. Calabotta (BSE 1989) of Quincy, IL, March 28, 2017.

Frederic A. Carlson (BSCE 1950) of Decorah, IA, October 7, 2016.

Michael J. Conlon (BSCE 1962) of Dubuque, IA, January 24, 2017.

Frederick M. Dahlmeier (BSEE 1969) of Riviera Beach, FL, March 6, 2017.

Michael R. English (BSEE 1967) of Iowa City, IA, April 17, 2017.

James R. Funk (BSEE 1939) of Napa, CA, February 10, 2017.

Martin P. Golden (BSME 1949, MS 1950) of Roswell, GA, December 19, 2016.

Fred B. Greusel (BSChE 1950) of Leawood, KS, November 18, 2016.

James C. Groenewold (BSME 1963) of Sioux City, IA, November 9, 2016.

Miles J. Hamilton (BSME 1947, MS 1949) of Laguna Beach, CA, December 8, 2002.

James C. Heskje (BSME 1968, MS 1969) of Cedar Rapids, IA, January 17, 2017.

David M. Hiller (BSCE 1955) of Indianola, IA, March 3, 2017.

Chris Holloway (BSE 1994) of Humboldt, TN, March 11, 2017.

Wayne D. Jacobson (MS 1939) of St. Paul, MN, January 19, 2014.

Hirschel A. Katz (BSChE 1963) of Henderson, NV, January 13, 2017.

Donald Kehn, Sr. (BSChE 1944) of Houston, TX, March 18, 2017.

William R. Kelso (BSME 1949) of The Villages, FL, February 19, 2017.

Robert A. Koppes (BSME 1948) of Freeport, IL, March 18, 2017.

Charles W. Lazenby (BSME 1950) of Lake Stevens, WA, March 2, 2017.

Donald C. Malm (BSChE 1957) of Collinsville, IL, May 29, 2016.

Earl H. Meyer (BSCE 1943) of Slidell, LA, September 17, 2016.

Earl M. Olson (BSChE 1941) of Columbia, SC, November 17, 2016.

Dennis L. Platteter (BSCE 1968) of Maple Plain, MN, November 16, 2016.

James R. Rozinek (BSME 1957) of Del Mar, CA, March 5, 2011.

Newton N. Sacks (BA 1941, BSEE 1941, MS 1969) of San Diego, CA, November 4, 2016.

Glenn E. Salley (BSME 1970) of Pleasant Prairie, WI, December 16, 2016.

Wilbur J. Schindler (BSME 1939) of Poway, CA, September 22, 2016.

John F. Schwegler (MS 1964) of Rock Island, IL, October 1, 2016.

Jesse A. Shore (BSME 1960) of Manchester, TN, January 2, 2017.

Jack M. Smith (BSME 1948) of Fresno, CA, October 13, 2016.

Richard G. Smith (BSME 1960) of Oceanside, CA, May 9, 2012.

Donald R. Stevens (BSEE 1957) of Cedar Rapids, IA, April 8, 2016.

Frank A. Tillman (PhD 1965) of Lake Ozark, MO, February 26, 2017.

Duane C. Unga (BSIE 1960) of Davenport, IA, March 6, 2017.

Anthony R. Walsh (BSE 1993) of Circle Pines, MN, December 12, 2016.

Richard M. Welk (BSME 1964) of Wapello, IA, March 15, 2017.

Ford C. Williams (PhD 1948) of Nanoose Bay, British Columbia, Canada, July 19, 2007.

John B. Wirtz (BSCE 1959) of Goshen, IN, December 16, 2010.

Robert D. Wood (BSEE 1952) of Plantersville, TX, January 26, 2016.

Stephen E. Wright (BSEE 1947, MS 1948) of Rydal, PA, March 11, 2017.

Jack D. Young (BSEE 1942) of Union City, GA, February 2, 2016.



Lou Landweber inducted into Legacy of Iowa Engineering

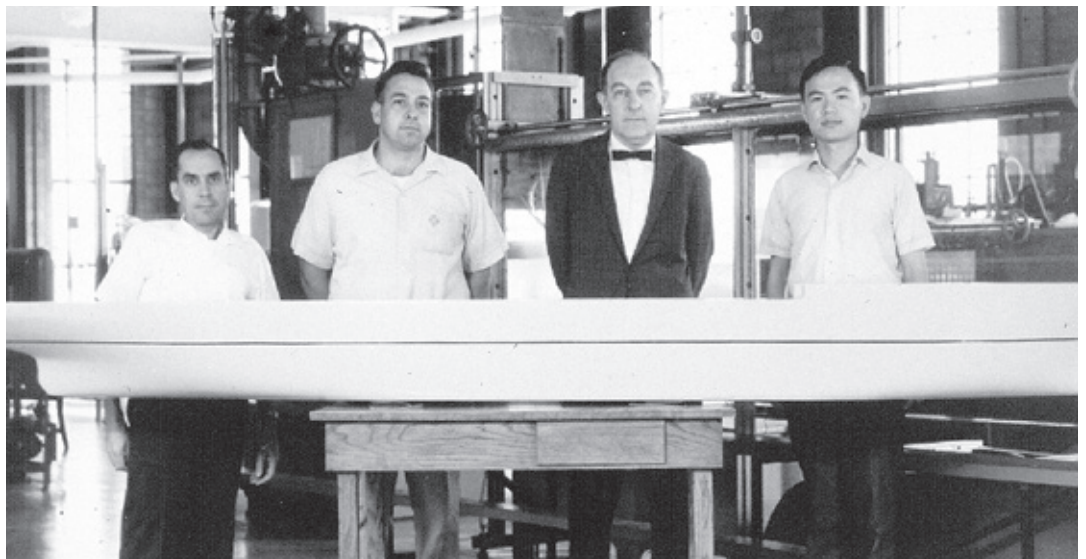


The late Louis Landweber, professor of mechanics and hydraulics and research engineer, IIHR--Hydroscience & Engineering, was inducted April 25 into the College of Engineering's Legacy of Iowa Engineering.

Landweber came to the University of Iowa in 1954. His many honors include: appointed David W. Taylor Lecturer, recipient of the Davidson Medal, presented by the Society of Naval Architects and Marine Engineers, named Weinblum Memorial Lecturer, and election to the National Academy of Engineering, for his "research, design, and educational contributions to modern naval architecture and marine engineering."

Under his guidance, IIHR became a national leader in naval architecture and ship hydrodynamics research. His more than 50 MS and PhD students remember him best for his integrity, warmth, support, and humor—characteristics that rival even his vast technical achievements.

The Legacy of Iowa Engineering honors faculty, staff, alumni, and friends of the College of Engineering who made exceptional historical contributions toward advancing the College in teaching, research, or service during their engagement with the college.



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