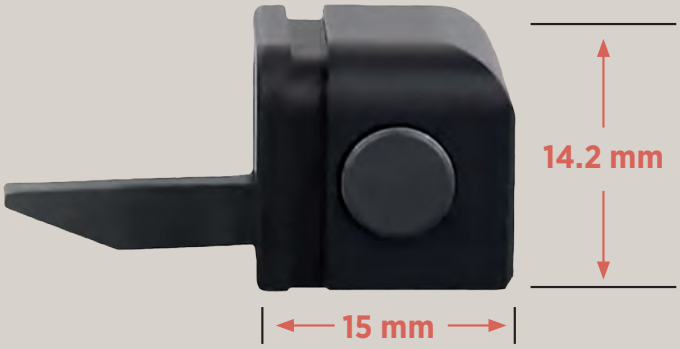
DARTMOUTH
Engineer
THAYER SCHOOL OF ENGINEERING | SPRING 2025

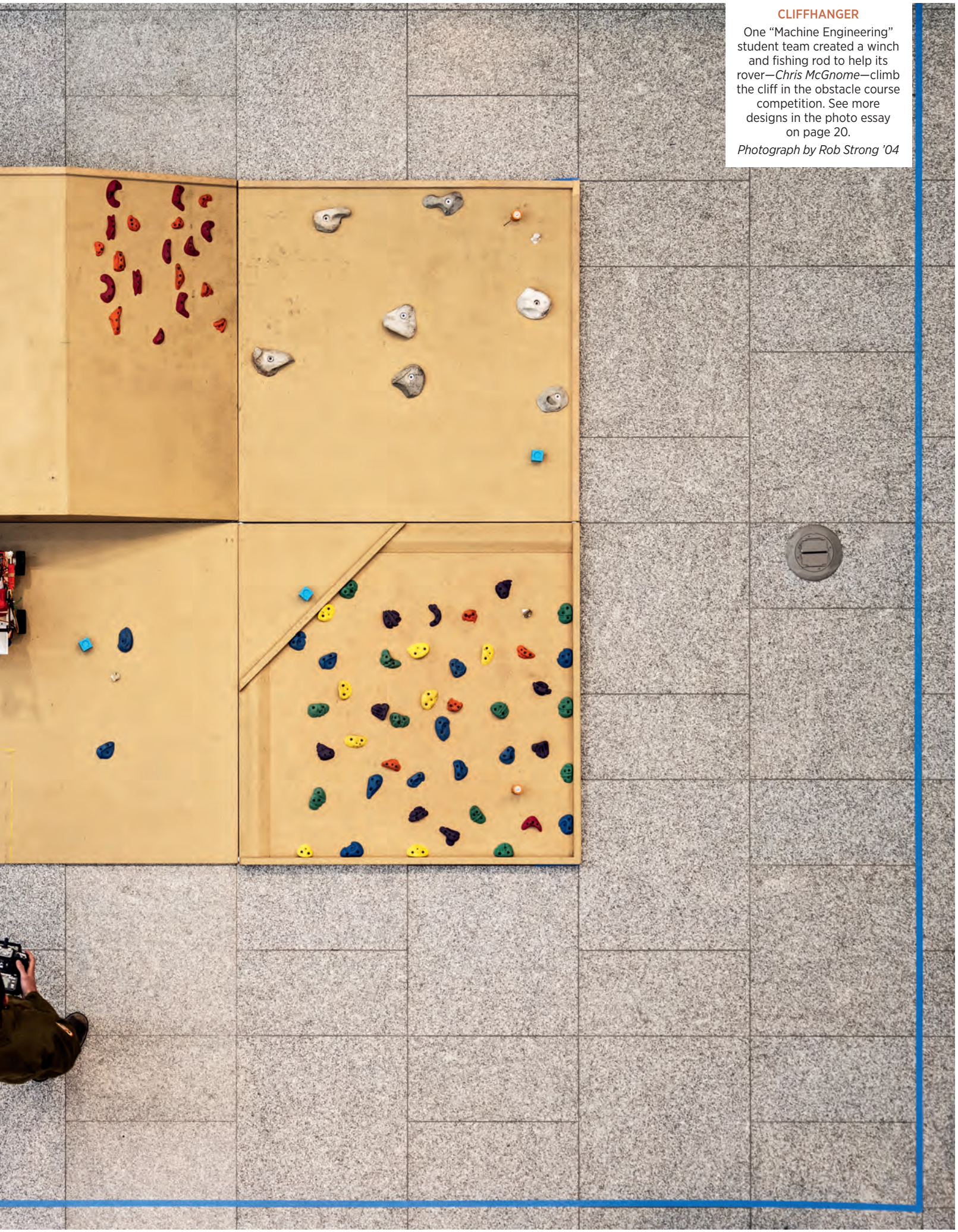
THIS DEVICE, 3D-PRINTED FOR 40 CENTS, CAN TURN A GUN INTO AN AUTOMATIC WEAPON.



A DARTMOUTH TEAM IS USING DESIGN THINKING TO DISABLE THE THREAT.

inside

First Look



CLIFFHANGER

One "Machine Engineering" student team created a winch and fishing rod to help its rover—*Chris McGnome*—climb the cliff in the obstacle course competition. See more designs in the photo essay on page 20.

Photograph by Rob Strong '04

Dartmouth Engineer
Volume 19 / Number 2

Contents

Contact Us
Office of Communications
Thayer School of Engineering
15 Thayer Drive
Hanover, NH 03755

dartmouth.engineer@dartmouth.edu
Tel. 1+ (603) 646-3521

Dartmouth Engineer Online
dartmouthengineer.com

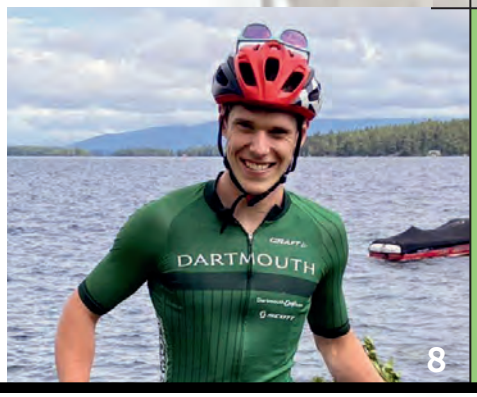
Dartmouth Engineering Website
engineering.dartmouth.edu

Report Address Changes
engineering.alumni.records@dartmouth.edu

DARTMOUTH ENGINEER
is published twice a year for the Thayer School of Engineering at Dartmouth community.

Printed by Villanti Printers

➤ Thayer's Emily Monroe (left) and Professor Sol Diamond (far right) are introducing design thinking to students and the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). Photo by Rob Strong '04



DEPARTMENTS

THE Great Hall

NEWS FROM AROUND THAYER

PhD candidate Peter Bertone and Professor Hixon discuss scaffold options.

ROB STRONG '04

INNOVATION

Tissue Engineers Aim to Improve Quality of Life

CANCER TREATMENT CAN SAVE a patient's life but often leaves substantial damage in its wake. When surgeons remove cancerous tumors, they frequently take significant portions of adjacent tissue and bone that can alter a patient's appearance and impair bodily functions. Dartmouth Engineering Professor Katie Hixon is leading a team of graduate, undergraduate, and medical students to develop methods to repair, rehabilitate, and replace such damaged tissue to improve patients' quality of life after cancer treatment.

"Tissue-engineered scaffolds serve as vehicles," says Hixon, who is also clinical assistant professor of orthopedics at Dartmouth's Geisel School of Medicine. "With them, you can deliver chemotherapies,

help the tissue to repair after radiation, or even modify the immune response."

In her labs at the Class of 1982 Engineering and Computer Sciences Center and the Williamson Translational Research Building at Dartmouth-Hitchcock Medical Center, Hixon and her research team use cell therapies, biomaterial scaffolds, and growth-factor delivery systems to create customized, living tissue constructs. Such tissue-engineered scaffolds enable surgeons to restore, improve, and replace damaged tissue.

These implants can help the body heal itself after surgery, when the bone is usually very weak and prone to infection and fracture, and provide support for healthy bone to grow back.

"Ideally, our scaffold strengthens the site of injury," Hixon says. "Then it degrades over time as the tissue replaces it, attracting the right types of cells, blood vessels, and other components for healthy tissue regeneration."

The Hixon Lab is exploring how scaffolds respond to radiation, which "is very harmful to tissue and prevents new bone from forming or forming very well." To better understand how the scaffolds might respond, Hixon is using animal models to determine whether they "bypass inappropriate or insufficient bone formation and lead to proper healing"—which could be very promising for human patients. And while students and residents assist with surgeries and analysis of research data, Hixon's team also works with students in Dartmouth's Tuck School of Business to move research down the accelerator pipeline.

Her next goal: bioengineering solutions for craniofacial reconstruction. "We want to move to more complex structures and geometry, such as tumors in the jaw, which is complicated because your face is so intricate and important in how we communicate," says Hixon. "We're all really passionate about helping people to feel like themselves again." *—Jeremy Martin*

DON HAMERMAN

"There's a lot of resilience in my story, and my journey here was a long one. That's what motivates me."

—TRIUMPH KIA TEH '26

▲ Triumph Kia Teh '26 was one of seven students in his class selected for the King Scholars Program.

KING SCHOLAR

Committed to Community

TRIUMPH KIA TEH '26 IS KNOWN FOR HIS COMMITMENT to his peers. "My main passion is contributing to the community," says the biomedical engineering and neuroscience double major. Teh was one of seven students in his class selected for the King Scholars Program, which supports first-generation low-income students from developing nations who are determined to alleviate poverty in their home countries. He grew up in Cameroon, where he and his family experienced the country's inaccessible healthcare structure firsthand. "After seeing doctors attend to my mother's health problems, I knew I wanted to become a doctor myself," he says. "I also hope to establish a hospital back home one day."

He has found support for his ambitions across campus. Through the Dickey Center for International Understanding, Teh secured an internship with Vantage Health Technologies, a company working to increase access and efficiency in health care. As a Pathways to Medicine Scholar, he will begin research at Dartmouth-Hitchcock Medical Center later this year.

Outside the classroom and lab, Teh often leads a peer workshop for the Office of Pluralism and Leadership called "What's in Your Backpack?"—an activity that prompts students to share how life experiences have affected their character. "We all come into Dartmouth from very different communities," he says. "Sharing what we each have in our 'backpacks' allows us to really understand and know one another. There's a lot of resilience in my story, and my journey here was a long one. That's what motivates me. I'm ready now."

DEVICE TEST

Preventing Bone Loss in Space

A DARTMOUTH PROJECT aboard the *Polaris Dawn* mission this past fall may help address two major health risks of space flight—the breakdown of astronauts' bones in zero-gravity and the resulting danger of developing kidney stones. When subjected to weightlessness, bones freed from the burden of supporting the human body leach calcium. The shedding of this critical element reduces bone density and, as calcium enters the urine, heightens the chance of painful kidney stones forming in the urinary tract.

Through the fall space mission, researchers at Thayer and the Geisel School of Medicine tested a critical element of a handheld device they are developing to alert space crew members to high levels of calcium in their urine so they can take action. The project examined whether the day's first urination—or first morning void—provides enough information on urinary calcium concentration for astronauts to gauge the risk of losing bone density and forming kidney stones. "To have that real-time data would be invaluable for astronauts' health," says Mimi Lan, a doctoral candidate in engineering who is leading the testing and evaluation of the handheld device under the leadership of adjunct engineering professor Jay Buckey, a former astronaut and current director of the Dartmouth Space Medicine Innovations Lab. "We need good solutions to keep people healthy in space, especially if they don't have room to exercise to maintain their bone and muscle mass."

—Morgan Kelly

"To have that real-time data would be invaluable for astronauts' health."

—MIMI LAN
PHD CANDIDATE

FIELDWORK

Study Predicts Sea-Level Rise for Future Generations

A MULTI-INSTITUTIONAL STUDY LED BY PROFESSOR Hélène Seroussi extends scientists' predictions of how greenhouse gas emissions will likely affect sea-level rise beyond the 21st-century. Published in *Earth's Future* magazine, the study is the first to combine data from 16 different ice sheet models that shows, with continued high emissions, Antarctic's contribution to sea-level rise increases rapidly from the years 2100 to 2300.

"Our study provides the long-term projections that have been lacking," says Seroussi. "The results show that, pushing beyond 2100, the gap between low-emission and high-emission scenarios grows quickly and differences in long-term impact for the most susceptible regions become exaggerated." Nearly a quarter billion people currently live within 3 feet of high-tide lines. The new combined model predicts that under a high-emissions scenario, Antarctica could add more than 5.5 feet to sea levels by 2200.

The team—which includes Professor of Earth Sciences Mathieu Morlighem and Jake Twarog '24 Th'24 as well as researchers from the Norwegian Research Center, Bjerknes Centre for Climate Research, and Centre for Ice, Cryosphere, Carbon and Climate Polar Research Hub—also found that although the time when these glaciers start retreating varies depending on the ice flow model, the speed at which they experience large retreats is consistent once they begin. "All models agree that once these large changes are initiated, nothing can stop or slow them down," says Seroussi. "This collaboration means we have a better, more robust assessment of the uncertainty, and we can see where to focus our future research."

—Catha Mayor

LEFT: ALEX RIVEST; FAR LEFT: SPACEX

Researcher Arthur Pétusseau Th'23 demonstrates the PRESTO camera.

New Way to See Cancer

RESEARCHERS AT DARTMOUTH ENGINEERING AND THE University of Wisconsin-Madison are one step closer to a new method to help surgeons distinguish cancer from healthy tissue in real time. Their results, published the *Proceedings of the National Academy of Sciences*, demonstrate a way to use pressure to reveal diseased tissue with poor vasculature, characterized by low oxygen levels—a hallmark of many malignant tumors.

"Even in normal tissue, applying pressure reduces blood flow and therefore tissue oxygen levels," says researcher and first author Arthur Pétusseau Th'23. "It's like when you press a finger into the skin of your hand and then release it, you can see the blood return quickly. But in tumors, that effect is sustained because the blood flow in tumors is much slower. We leverage this difference to create high contrast between malignant and normal tissue."

The most aggressive, fastest-growing tumors tend to have the least-efficient blood flow, making them more prone to oxygen deficiency, known as hypoxia. The researchers developed an imaging system—Pressure-Enhanced Sensing of Tissue Oxygenation (PRESTO)—that can measure oxygen variations when a surgeon applies pressure to tissue. "While there are many oxygen-measuring devices, such as the blood oxygen saturation probes you see on smartwatches, what makes our technology unique is that it maps intracellular oxygen distribution and gives real-time feedback to the surgeon," says Pétusseau.

The team is working with Dartmouth Health's dermatology department on a human clinical study of PRESTO, and the system's success prompted Pétusseau to cofound Hypoxia Surgical with Professors Brian Pogue and Petr Brůža. —*Catha Mayor*

"What makes our technology unique is that it maps intracellular oxygen distribution and gives real-time feedback to the surgeon."

—ARTHUR PÉTUSSEAU TH'23

ABOVE: CATHA MAYOR; RIGHT: JOHN SHERMAN

BIOFUELS

Solution for Food vs. Fuel Debate

A NEW STUDY PUBLISHED IN *Environmental Research Letters* could transform the longstanding perceived food vs. fuel conflict that has limited support for biofuels for decades. Conducted by a team of 13 authors led by Professor Lee Rybeck Lynd Th'84 Th'87, the research describes a strategy for using crop residues to produce large amounts of biofuel, improving—not sacrificing—the sustainability and economics of food production.

The study challenges the conventional belief that biofuels made from crop residues, such as straw, decrease soil carbon levels when residues are removed from the field. Instead, Lynd and colleagues provide evidence this decrease can be avoided by returning the unfermented byproduct of biological conversion of crop residues to the soil. This practice can also reduce the cost and greenhouse gas emissions associated with nitrogen fertilizer application.

The potential is significant. The paper estimates that converting half of the 100 exajoules (EJ) of global crop residues produced annually could yield approximately 25 EJ of liquid fuel, depending on the process. This is significant compared to the approximately 15 EJ of fuel used by the global aviation sector, where biofuels are widely considered a leading low-carbon option. Currently, global production of transportation biofuels is around 4 EJ.

Professor Lee Rybeck Lynd Th'84 Th'87 researches strategies for using crop residues to produce large amounts of biofuel.

DARTMOUTH BIKES TEAMMATES Raif Olson '24 Th'25 (above) and Wendell Wu '23 Th'24 tapped into their experiences on the street to create a system that enables bike-walk-friendly town planning. With fellow Dartmouth Engineering students Andrei Gerashchenko Th'24, Zachary Nelson-Marois '24 Th'24, and Jake Twarog '24, they developed "Bike Walk Census Tool Designed for More Inclusive Transportation Planning in College Downtown"—and won a $10,000 Engineering Education Award from the National Council of Examiners for Engineering and Surveying.

"[We] built a person-counter using an object detection algorithm to see how many people pass through an area over a given time," says Olson.

Their portable and automated tool improves on existing systems, which regularly count cars but only sporadically count pedestrians and cyclists to gauge road usage patterns. "We'll be able to tackle a lot of problems with a device that runs on its own," says Jennie Chamberlain, a Hanover Selectboard member and chair of the Hanover Bike-Walk Committee, the project's sponsor. "It will not only save time but also enable us to think more holistically about where and how people move around." *—Catha Mayor*

"[We] built a person-counter using an object detection algorithm to see how many people pass through an area over a given time."

—RAIF OLSON '24 TH'25

PROFESSORS

New Faculty

YOSHIHIRO NAKAYAMA

HUNG V.-T. NGUYEN

DARTMOUTH ENGINEERING HAS WELCOMED THREE tenure-line faculty in 2024.

Assistant Professor Yoshihiro Nakayama is researching oceanography, sea ice, and ice-ocean interactions in the Changing Polar Regions Academic Cluster. He received his BS in mechanical and aerospace engineering at Nagoya University and studied environmental science at Hokkaido University before earning a PhD in natural sciences from the University of Bremen. "I aim to understand the past, present, and future states of the Southern Ocean and identify the causes of ocean warming and Antarctic ice loss on various time scales," he says.

Assistant Professor Hung V.-T. Nguyen's research aims to leverage advancements in polymer chemistry and molecular engineering toward developing novel platforms for drug delivery and nanomedicine. "This is achieved by leveraging advancements in synthetic polymer chemistry, molecular engineering, cancer biology, and precision medicine—comprising a convergent engineering toolbox," he says. This would enable us to examine complex biological questions, as well as to translate novel therapeutics." Hung received his PhD from MIT as a National Science Foundation fellow and cofounded and led therapeutics development at Window Therapeutics—a startup focused on drug delivery platform technologies.

Professor Irene Georgakoudi '93 returns to Dartmouth as co-director of the Translational Engineering in Cancer Research Program at Dartmouth Cancer Center. She explored photophysics as a PhD student at the University of Rochester and laser-based diagnostics as a postdoctoral fellow at MIT and was most recently a professor of biomedical engineering and director of the Advanced Microscopic Imaging Center at Tufts. "I work on developing noninvasive technologies that harness the natural 'glow' of cellular and extracellular tissue components to enable a new level of understanding of tissue function and dysfunction," she says.

Irene Georgakoudi '93 returns to Dartmouth as a professor.

FAR LEFT: RAIF OLSON; NEAR LEFT: CATHA MAYOR

Kudos

HONORED **Professor Eric Fossum** was awarded the National Medal of Technology and Innovation at the White House in recognition of his pioneering work creating digital imaging sensors that power modern cameras.

PRESENTED PhD student **Ene Michelle Igomu** earned first place in the 3-Minute Thesis competition at the Ivy Collective for Inclusion in Engineering Doctoral Symposium for her presentation on "Revolutionizing 3D Catalyst Design for Green Hydrogen Production." Fellow PhD students **Allaire Doussan** and **Yanqiao Li** were among the nine finalists.

AWARDED **Professor Wesley Marrero** earned a Best Paper Award from the Institute for Operations Research and the Management Sciences (INFORMS) as coauthor of a paper in *Manufacturing & Service Operations Management* that uses optimization to design clinically intuitive hypertension treatment protocols.

PUBLISHED PhD students **Simon Agnew '22, Sam Ong**, and **Saifur Rahman**, research associate **Anand Tiwari**, and **Professor Will Scheideler** coauthored "Hypoeutectic Liquid Metal Printing of 2D Indium Gallium Oxide Transistors" in *Small* magazine.

FUNDED **Professor Geoffrey Luke** received a $2.2-million, four-year grant from the National Institutes of Health to combine ultrasound imaging with tumor-targeted nanodroplets to detect the presence of oral cancer in lymph nodes.

PITCHED PhD student and Surgical Innovation Fellow **Peter Bertone** won the 2024 Orthopaedic Research Society International Section Fracture Repair 3-Minute Research Pitch Competition with "Post-Radiation Renovation: Re-building Stronger 'Homes' with Better Bones."

PUBLISHED Research associates **Yihuang Xiong** and **Jiongzhi Zheng**, PhD student **Shay McBride**, and **Professor Geoffroy Hautier** coauthored "Computationally Driven Discovery of T Center-like Quantum Defects in Silicon" in the *Journal of the American Chemical Society.*

AWARDED PhD students **Yanqiao Li** and **Bahlakoana Mabetha**, advised by **Professor Jason Stauth**, received $50,000 from the National Science Foundation's Innovation Corps training program to commercialize their novel high-voltage, low-power drivers for haptics.

PUBLISHED PhD students **Huan Zhao** and **Xiangbei Liu** and **Professor Yan Li** coauthored "Architecture Design of High-Performance Piezoelectric Energy Harvester with 3D Metastructure Substrate," featured on the cover of Advanced Theory and Simulations. And with PhD student Ya Tang, they coauthored "Design of Metamaterial Thermoelectric Generators for Efficient Energy Harvesting" in Energy Conversion and Management: X.

With NOAA funding, the Thayer team will develop additional SIMB buoys with added sensors for sunlight, water salinity, and snow depth.

PHOTO BY ALFRED-WEGENER-INTITUT/ESTHER HORVATH

NOAA AWARD

Better Sea Ice Monitoring

As part of a new $1.8-million investment by the National Oceanic and Atmospheric Administration (NOAA), a team led by **Professor Donald Perovich** was awarded $296,000 to enhance ocean-monitoring technologies in the Arctic. He will use the award to increase the number and capability of seasonal ice mass balance (SIMB) buoys, which compares the amount of winter ice growth and summer ice melt. There are approximately one dozen SIMB buoys in the Arctic collecting data on temperature, air pressure, and ice thickness, and NOAA has been funding the deployment of Dartmouth's SIMB buoys in the Beaufort Sea, just north of Alaska, for the past six years. With this additional funding, the Thayer team will develop additional buoys with added sensors for sunlight, water salinity, and snow depth. Perovich has relied on the expertise of many engineering students to help design and build buoys that are both robust and cheap. The original SIMB was developed by **James Whitlock Th'18** and **Cameron Planck Th'21**, who founded Cryosphere Innovation, which provides data-collection equipment worldwide. Meanwhile, PhD student **Ian Raphael '18 Th'21** (shown, right, installing a SIMB) is developing a new system for observing and tracking snow thickness. As for light, "We have some simple light sensors ready because a few years ago **Mary Tobin '20 Th'20** did her senior thesis on how to put optical sensors on the buoys," says Perovich. Meanwhile, PhD Innovation Program student **Savannah Byron** is interested in building on Tobin's work to design more sophisticated light sensors. "It amazes me what these students accomplish," he says. *—Catha Mayor*

A GLOCK SWITCH CAN BE 3D-PRINTED FOR 40 CENTS—AND TURN A GUN INTO AN AUTOMATIC WEAPON.

DARTMOUTH ENGINEERS ARE USING

DESIGN THINKING

TO DISABLE THE THREAT.

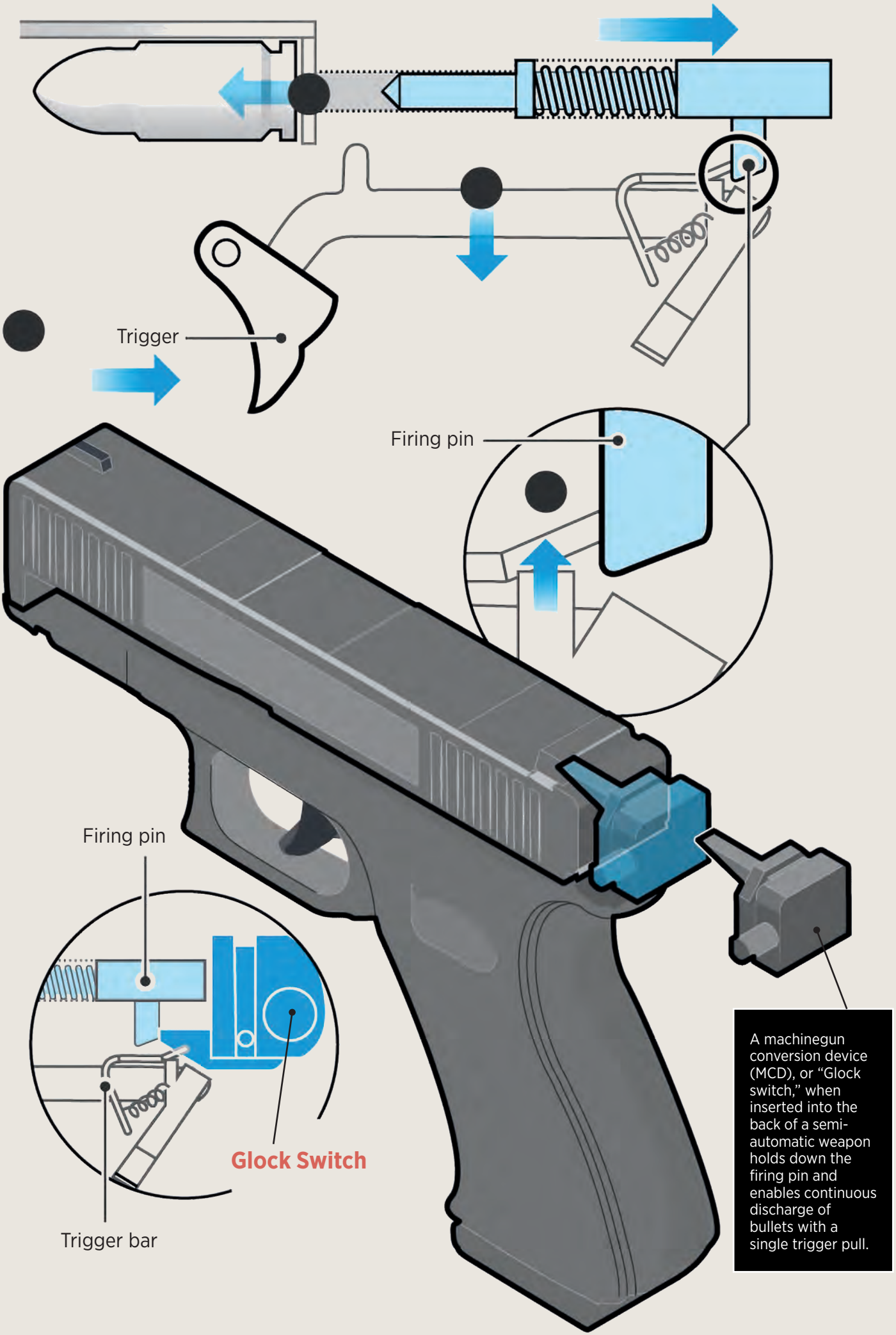
BY MICHAEL BLANDING

The small piece of plastic looks harmless enough—a cube with a few holes and tabs sticking out in different directions—at worst a choking hazard for small children. In the wrong hands, however, it can kill or wound dozens of people in an instant. Known as a machinegun conversion device (MCD) or Glock switch, the object fits into the back of a semiautomatic pistol or rifle, transforming it into a fully automatic weapon that can spray up to a thousand rounds of ammunition with one pull of a trigger. Although MCDs are illegal in the United States, anyone can order them from the darker corners of the Internet for $20 or $30 each. Or worse, they can make one on a 3D printer for pennies.

"Gun violence is the leading cause of death for American children—not cancer, not car crashes—guns," Steven Dettelbach '88, former director of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) told an audience at Dartmouth last February, noting 43,042 people were killed and 36,336 injured by gun violence in the United States in 2023. Despite fully automatic weapons being outlawed a hundred years ago in the age of Al Capone and the Tommy gun, they have recently been making a dramatic return. "Thanks to the bad kind of tech innovation, the misuse of 3D printing," Dettelbach said, "machineguns are coming back to American streets."

While on campus, Dettelbach reached out to Alexis Abramson, then dean of Thayer, for help. Theoretically, 3D printers could be modified to prohibit the printing of MCDs—but could that be done in practice? And how could such a technological change be instituted on a nationwide scale? Abramson knew just where to turn: the Design Initiative at Dartmouth (DIAD), which she helped launch in 2021 to harness engineering know-how and design thinking to solve wicked challenges.

"DIAD's central hypothesis is that the methods and mindset of design can unlock desired futures where society is vexed right now," says codirector Sol Diamond '97 Th'98. "We're hungry for problems that we can solve with the human expertise and resources at Dartmouth." During the past year, he's led a project partnering with law enforcement, industry, and academia to tackle the complex issues—including technological, legal, commercial, and social—involved in getting MCDs off the streets. Along the way, Diamond and his team of faculty and students have proposed not only technological solutions to the machinegun problem but also a dramatic remaking of the 3D printing industry.



A machinegun conversion device (MCD), or "Glock switch," when inserted into the back of a semi-automatic weapon holds down the firing pin and enables continuous discharge of bullets with a single trigger pull.

TONIA COWAN/*THE WALL STREET JOURNAL*

HUMANS AT THE CENTER

Diamond is uniquely suited to tackle the issue. A professor of engineering at Thayer, he has a background in biomedical imaging and taught courses in computer-aided design (CAD), including rapid prototyping through 3D printing. At the same time, he's applied an entrepreneurial mindset as CEO of medical imaging startup Lodestone Biomedical. When Abramson contacted him, Diamond's first act was to pull in colleague Emily Monroe, director of Thayer's Cook Engineering Design Center (CEDC)—and a former engineer for firearms manufacturer Sturm, Ruger, & Co. and award-winning competitive target shooter.

They met over dinner with Dettelbach and his team to learn more about the issue. During the past five years, law enforcement has recovered more than 31,000 MCDs across the country, many printed at home by teenagers, and some used in horrific acts of violence—a drive-by shooting in Cincinnati in 2023 that left an 11-year-old dead and four other children wounded; a 2023 mass shooting at a "sweet sixteen" party in Alabama that killed four; a 2022 shooting in Sacramento that killed six; a police officer murdered in a hail of bullets while serving a warrant in Houston in 2021. Known variously as auto sears and chips, MCDs have become so common they are now found in the majority of illegal gun cases.

"For a lot of people, this is an everyday existence," says Monroe. "It's 13- to 19-year-old boys at home printing these things, dropping them into their parent's AR-15, and creating a military-grade weapon. It's just that easy."

Diamond and Monroe enlisted DIAD program manager Paula Olson, an expert on human-centered design with a background in human ecology and law, a "translator across disciplines" who takes a systems-level view of solving problems. The Dartmouth Engineering team then took a deep dive into additive manufacturing (as the 3D printing industry is known), including the hardware and software. Members reached out to sources at Thayer's MShop and makerspaces as well as "blitzing LinkedIn" to speak with more than 100 people from industry and law enforcement. "There was a lot of zooming in and zooming out, thinking, who is going to be at the meeting today, what are their needs? What are their alignments? What are their tensions?" Olson says.

For inspiration, the team examined other cases in which technology prohibited elicit material. Every inkjet printer, for example, has a feature that prevents it from printing counterfeit currency. In the early 2000s, peer-to-peer software such as Napster suddenly made it easy to download and share music files without authorization—until labels learned how to insert copyright-protected music files. That innovation led directly to today's streaming platforms such as Pandora, Spotify, and Apple Music, allowing consumers to play almost any song through a subscription. "Those market forces were critical to the digital music economy," Diamond says.

Intense research and interviewing are the first steps in the process of human-centered design, in which the goal is to empathize and understand the people for which a product or service is being designed. Then comes defining the problem, ideating solutions, creating a prototype, and further iterating based on feedback. "We teach ethnographic methods of interviewing and observing and identifying one's own assumptions before going out and doing anything," says Associate Professor of Engineering Eugene Korsunskiy, Diamond's codirector at DIAD.

As an engineering school within a liberal arts university, he says, Thayer is uniquely suited to teach those skills. "Whether you are designing physical objects or systems or organizations, it means being a creative and collaborative person who can harness the technological skills of innovation as well as the liberal arts skills from psychology and sociology to understand how people behave and what they value."

In the past two years, DIAD has built on the already formidable strengths in design at Dartmouth, which has offered a human-centered de-

PHOTOGRAPH BY ROB STRONG '04

"DIAD'S CENTRAL HYPOTHESIS IS THAT THE METHODS AND MINDSET OF DESIGN CAN UNLOCK DESIRED FUTURES WHERE SOCIETY IS VEXED RIGHT NOW."

—PROFESSOR SOL DIAMOND '97 TH'98

minor for more than a decade. DIAD doubles down on those strengths with three pillars: spearheading new classes such as "Ethics in Design" and "Narrative Design for Innovators"; partnering with campus organizations to find solutions through Design Corps; and fostering societal impact through partnerships with government, industry, and nonprofits (see sidebar). "For us, human-centered design is the kind of creative problem solving that exists at the intersection of all the messy considerations of the technical, legal, and societal," Korsunskiy says.

INCENTIVES FOR SOLUTIONS

The MCD problem fits smack dab in the middle of that crossroads. On a technical level, printing a 3D object consists of precisely forming layer after layer of material. The information making that possible exists within a computer file, usually in STL format, that includes the shape's coordinates sliced into layers that are transmitted to the machine through instructions called G-Code. If they were going to intervene to stop the process, Diamond and his colleagues realized, they'd have to identify the files leading to MCDs and stop the slicing before it occurred.

With dozens of websites full of files by the thousands, that meant creating a process to identify the essential elements that make an object an MCD and distinguish it from a legitimate object. To do that, Diamond has employed statistics and image-processing techniques to flag the key components that make the various types of MCDs work, while ignoring those that don't. Diamond performed the analysis with the help of Jenna Miller '24 Th'25,

(*continued on page 29*)

DESIGN THINKING FOR THE GREATER GOOD

The MCD project isn't the only one using design thinking to impact the world. CEDC Director Monroe estimates about half of the engineering capstone projects each year partner with nonprofits to design human-centered solutions for societal good. "Students are being equipped to be leaders in society and thinking how they can use their engineering tools to improve lives," she says. Recent projects include the following.

- **BIKE WALK CENSUS TOOL** Although cars are regularly counted for road usage patterns, pedestrians and cyclists are counted only sporadically through a time-consuming hand count process. Students developed an object detection algorithm to automatically count bikers and walkers to better design streets for their use.
- **ARTERY ASSIST** Despite placing 8 million arterial lines annually to treat U.S. patients, healthcare professionals miss the mark more than a quarter of the time, requiring them to re-puncture the skin and distress their patients. This project developed a "stud finder" using an audio signal with LEDs and a laser pointer to more accurately identify the best place to stick.
- **OPEN-SOURCE PFAS FILTER** Toxic PFAS chemicals, known as "forever chemicals," increase risks for diseases such as cancer. Students created a low-cost wastewater filter for the carpet-cleaning industry that can remove 95 percent of PFAS from the water.
- **NET-ZERO FARMHOUSE RETROFIT** Although new construction is often created with sustainability in mind, existing housing can be left behind. This project took a rundown Upper Valley farmhouse and transformed it using solar panels and insulation to achieve net-zero energy use from the grid.
- **BACKCOUNTRY MEDICINE** Students are collaborating with the military to develop medical devices for remote locations, including an osteophone that uses sound to determine if a bone is broken and evacuation is needed. Another project aims to help emergency personnel better intubate a person by using chemical reactions to measure oxygen flow.
- **EASY DE-ICING MINI-SPLIT** HVAC systems are becoming more common; one problem, however, is that the outside compressor can freeze on cold days so it brings in cold instead of heat. Students are working to implement technology out of Thayer's Ice Lab that uses a pulse of electricity to efficiently de-ice surfaces.

"When I think about the future, we should be able to point to a world that is better off because of Thayer."

—DEAN ALEXIS ABRAMSON

"Curious to the

Core”

Outgoing Dean Alexis Abramson and incoming Dean Douglas Van Citters discuss Thayer’s spirit of collaboration and discovery.

PHOTOGRAPH BY ROB STRONG ’04

Dean Alexis Abramson, who has led Dartmouth Engineering since 2019, began a new role in January as dean of the Climate School at Columbia University. During the transition, she sat down with Interim Dean and Professor of Engineering Douglas Van Citters '99 Th'03 Th'06, until recently the associate dean for undergraduate education at Thayer, to reflect on her tenure and discuss his journey to Dartmouth, what makes a great leader, and the value of human-centered engineering.

ALEXIS ABRAMSON: Doug, you've been at Dartmouth for a while—you were an undergrad, earned your PhD here, been a longtime faculty member and researcher in artificial joints, an associate dean, the engineer of the Homecoming bonfire, and a faculty athletics representative. Tell me about that journey.

DOUGLAS VAN CITTERS: I grew up in Annapolis sailing and rowing and loving the sciences. My brother, sister, and I loved to work in science fairs. Both parents are scientists. When I was looking for colleges, I wanted to go somewhere I could row but also be an engineer. As part of my visit to Dartmouth in 1994, I sat down with [Professor] Stu Trembly. Stu and I talked about rowing and engineering and how it fit into the liberal arts at Dartmouth. It was an easy decision. I immediately discovered that I also loved geology and my art, architecture, and English courses. I found myself resonating with environmental earth sciences, so when I left Dartmouth, I was a practicing hydrogeologist for the company that sourced water for Poland Spring.

I came back to Thayer after a phone call with [Professor] John Collier, who explained I could earn my BE and find my way through a promotion at my company and also try biomedical engineering because that was his field. I fell in love with it. I enjoyed helping people and working with students directly, so I shifted from a BE/MS to a PhD. Fast forward, I have been able to engage deeply in all kinds of sciences at Thayer—medicine, materials science, mechanical engineering—it's all human centered. You can't do it without the wrapper that is regulation, economics, surgeons, and the human who is attached to an artificial joint—and all of that speaks to Dartmouth's strengths.

> "Our students are curious to the core, and from day one, they're unafraid to teach themselves to do something. Whether it's make, build, experiment—they're unafraid to engage in that uncertainty."
>
> —INTERIM DEAN DOUGLAS VAN CITTERS

ABRAMSON: You talk about making sure you had a liberal arts education. Did you see the impact of that education in the workplace?

VAN CITTERS: I did. In my first job as a geologist, I was on drill rigs and interacting with the client, my bosses, the professional engineers on the project, and the drillers. I was able to communicate with everybody and make sure the goals were clear—and also understand the impact of effectively bringing resources out of the ground in central Maine, understanding that the neighbors of this project had a stake in the game and were concerned or at least interested in what we were doing. It was rewarding to be able to think about things at that level.

Just yesterday, I was at lunch with another dean who's reasonably new to his position, and he said, "Remind me, what is the special thing about Thayer?" So, how would you have answered that question?

ABRAMSON: I answer that question often with prospective students. I say, "This is the weirdest school you will visit in all your visits across the country, and I mean that in a good way. Many schools teach you skills—we teach you foundational knowledge that exercises all parts of your brain to prepare you for a lifetime of problem solving." It's a very different approach to learning engineering, and you have to want that to come here.

VAN CITTERS: The key is that our students are curious to the core, and from day one, they're

unafraid to teach themselves to do something. Whether it's make, build, experiment—they're unafraid to engage in that uncertainty. That's an unusual trait in the sciences and it's what characterizes a Thayer engineer.

ABRAMSON: I'll capture it all in saying it's about being a human-centered engineer. You have to be broadly knowledgeable about the world not just about the math, and to be a good engineer you have to be human centered. It's quite a different approach.

VAN CITTERS: Speaking of teaching, I remember you were late to a dinner once …

ABRAMSON: Great. Thanks, Doug!

VAN CITTERS: Totally excusable because you came rushing and said, "I'm really sorry, I was teaching and we had Bill Gates with us." So, as you weave these things together, what have you seen in the classroom and in our students?

ABRAMSON: The class was an undergraduate writing seminar that could focus on a variety of different topics; in my case, energy and climate change. We were lucky to have guest speaker Bill Gates zoom in and talk to the students. It was wonderful to see these first-year students—some of them had STEM backgrounds and some of them had no intention in majoring in anything STEM—have a discussion you really couldn't have if you had only engineers in the room. The discussion took on a life of its own and went in a variety of different directions, down an economic path or how policy matters or even globally with some of the students from China or England or Brazil. Their global backgrounds just made that a richer educational experience for everybody. I'm sure you see elements of that in your roles, Doug. Tell me a little about your experience in the classroom and lab.

VAN CITTERS: I love teaching at both the undergraduate and graduate level. The thing that makes Dartmouth special is our classes are small and our students can engage with us as instructors and as colleagues. For the most part, they feel empowered to challenge us—and that is really fun. They ask questions, and I might only know the answer 75 percent of the time, but the students are so patient in waiting for me to generate an answer overnight. At the graduate level, that starts to verge into answers of, "Nobody knows the answer to that question, let's find it out together." And that's why our ability to do research with undergraduates and graduates working together is so important. Half of what we do is transfer knowledge and the other half is create knowledge.

I also enjoy going back to my lab. I've had an economist and a neuroscientist working in my laboratory. We're interdisciplinary by design, and the problems we work on are very challenging, so we need to bring in other fields to answer questions. I've found students are happy to engage, regardless of which side of campus they're from. They're happy to learn from us as much as we're happy to learn from them.

ABRAMSON: Well, that's an awesome perspective to have as an interim dean. You come with great experience and as somebody who truly gets the uniqueness of Thayer. As you build on that with this new role, I'm curious what aspects you are most looking forward to.

VAN CITTERS: From a personal side, I'm learning at a rate that I have not learned at since I was in graduate school. It is exciting for me to understand how all this works at the institutional level.

On the professional side, Thayer has been through explosive growth over this last decade. It's a good time for us to take stock, look at our new facilities, where the world is headed, and where our new faculty want to take their careers. I want to be an enabler to make sure faculty are growing in ways that continue the Thayer tradition, making an impact on society and solving problems that matter not only to them but also to the rest of the world. I'm excited to be a matchmaker and help them communicate with each other and the rest of campus to move forward on the strategic plan we developed five years ago. It is a good north star for me, so I'm excited to follow through on what was an intellectual commitment by everybody involved in the construction of that plan.

And then, of course, as the arts and sciences evolve, I want to be a partner in that. I think it's a way for us to grow Dartmouth intellectually in very positive directions.

ABRAMSON'S IMPACT
BY THE NUMBERS

RECORD-BREAKING ENROLLMENT

2,814

undergraduates took engineering courses in 2024, up from 2,486 in 2019

WOMEN IN ENGINEERING

47%

of 2024 graduate students were women (compared to 30% nationally)

27%

of engineering faculty are women (compared to 19% nationally)

ENCOURAGING ENTREPRENEURS

57%

tenure-line faculty earned patents in 2024

45%

tenure-line faculty have launched startups

RESEARCH AND INNOVATION

74

number of core faculty in 2024 (up from 60 in 2019), including 30 new professors since 2019

60%

jump in research expenditures to $38.1 million in 2024, up from $23.9 million in 2019

ABRAMSON'S TENURE

DEVELOPED A STRATEGIC APPROACH

Dean Alexis Abramson led Thayer in a multi-year strategic planning process that led to:

- new online MEng in computer engineering, Dartmouth's first fully online degree program;
- more than double the number of applications to PhD engineering programs; and
- joint educational partnerships with other schools at Dartmouth and around the world

EXPANDED THE STEM PIPELINE

In response to the passage of the $52.7-billion CHIPS and Science Act in 2022, Dean Abramson, along with Dartmouth President Sian Beilock and other women university presidents and deans of engineering, cofounded the EDGE Consortium to forge new pathways into STEM jobs and training. EDGE aims to double the number of trained, industry-ready engineers, typically underrepresented in the field, through professional development, coaching and mentorship, internships, and job placement.

LAUNCHED DIAD

The Design Initiative at Dartmouth (DIAD) was created in 2021 to bring design tools and mindsets to all corners of campus. From new courses to interdisciplinary research and off-campus projects, the initiative facilitates collaborative creativity at Dartmouth, using design thinking to bring together technology and the liberal arts and empowering the community to address society's most challenging problems.

CONNECTED IN THE CLASSROOM

The dean regularly taught:

- ENGS 156: Heat, Mass, and Momentum Transfer
- ENGS 7.08: Energy Sustainability: Technologies and Impact

ABRAMSON: Absolutely. And I'm curious, along those lines, what characteristics have you admired in successful leaders?

VAN CITTERS: That's a good question. Thinking about the most successful leader I've met, she is sitting across the table.

First, the most successful leader puts a highly functional group of people around them and then trusts that group to do their job and, to a degree, gets out of the way. They break down the barriers but otherwise trust that a job is going to get done—and well. Also, I've seen successful leaders always listen first. Even in our own interactions, you'll ask me a question and I'll tell you my opinion. If you don't agree with me and go in a different direction, you'll still value my opinion and say, "I hear you, but this is what I'm going to do and here's why."

I think a successful leader can bring that level of understanding first to a discussion, but then can also inform the folks who work with them about the context about what's happening in the bigger world and why decisions that might make sense on the local level don't make sense on the global level and that's why this has to happen. It means the leader has to make difficult decisions sometimes, but it's when the leader makes those decisions compassionately and explains why, that's when I think you see success. I also fully recognize that the most successful leader leads by example, and you see them working hard and inspiring people around them to work hard.

ABRAMSON: Yeah, I always say there are three types of leaders. There are ones who listen well but can't make a decision to save their lives. There are ones who don't listen and make decisions too quickly, and usually nobody likes them. And then there are ones who find that balance. It does take time to listen and then decide, and I strive to be that third type.

VAN CITTERS: What do you feel is your legacy?

ABRAMSON: I think we generated the strategic plan with a tie to our core values, which is probably the most important piece. I hope as things evolve and change, we continue to make sure that connection is there. While the strategic plan has goals and quantitative ele-

> **I've been excited about how we've included the faculty**
>
> **[to talk] about where there's real opportunity and where we could have the most impact."**
>
> —DEAN ALEXIS ABRAMSON

ments and all of that, I don't want people to think of this as a cold plan that's just numbers driven. Underlying those numbers are actions, activities that continuously ask the question, "Does this align with our core values, our mission, our ethos?"

When I started, there were faculty who expressed concern about growing and that we were going to lose our essence. I feel we've been able to move forward while maintaining a close-knit community, a sense of place, and the human-centeredness of what we do.

VAN CITTERS: The way I see the strategic plan, it's a guide to how we make decisions in the face of imperfect information or constrained resources. It draws us together with a common objective. Everybody agrees a decision can be made because we have a plan.

Speaking of decisions, what's an example of one you've made as Thayer dean that you feel was a great one?

ABRAMSON: I think I'll point to how we've grown the faculty. By the time I leave, we will have hired 30 or so faculty in the last five and a half years. It's always a challenge to decide what flavor of faculty we should be hiring. For example, we have a critical mass in areas such as medical imaging, and we have obvious opportunity in other areas such as artificial intelligence. With a limited budget, how do you make decisions regarding who to hire?

I've been excited about how we've included the faculty, and specifically the program area leads, in that process, giving them an opportunity to talk to their faculty constituents about hiring, about where there's real opportunity and where we could have the most impact. Sometimes, we went all in on very specific areas of opportunity. Other times, we did an open search and looked for superstars. It was a good balance of both to get us to a pretty awesome faculty today.

VAN CITTERS: As a participant in that process, I can say it's the model of how to engage faculty further despite the apparent addition of a layer of administration.

What it did was open communication channels for our faculty to identify what kinds of colleagues we need to make this place whole, and then empower people to go out and find them. And we've done a great job—hiring 35 is a significant number.

ABRAMSON: In the foreseeable 18 months, what's the imprint that you hope to leave and how do you hope to see Thayer grow with you as interim dean?

VAN CITTERS: I have a very concrete objective to have Thayer, in practice as well as in appearance, be a shining star on Dartmouth's campus so that the next dean can say, "This is a place that I want to take to the next level." I want to capitalize on the good things that we're doing, make sure that everybody's moving in the same direction, and excite our faculty and staff for the next chapter in Thayer's life. It's not going to be done by making massive changes but by really listening to how we want to grow together, and then making sure that's consolidated in a story that we can tell the next dean so they can pick it up and run with it.

ABRAMSON: When I think about the future, we should be able to point to a world that is better off because of Thayer. One could argue that we could do that today, but in the future, we'll have more ambassadors out there in the world who can say, "Without Thayer, without Dartmouth, I would not have been able to have this kind of impact." The faculty and their research will also let us continue to punch above our weight in terms of impact. There'll be new cures for diseases, new energy resources, new unintended consequences we will identify before they wreak havoc on our world because of the approach we use here at Thayer.

VAN CITTERS: Thank you. Great, I get the last question. I imagine you're starting to invest in new outfits, mostly light blue and blue in color. Can I convince you to carry something green, at least one Saturday in the fall, every year?

ABRAMSON: Absolutely.

VAN CITTERS: At the Dartmouth-Columbia football game.

ABRAMSON: I do love football and look forward to the game. And yes, I accept that challenge.

VAN CITTERS: It's on the record.

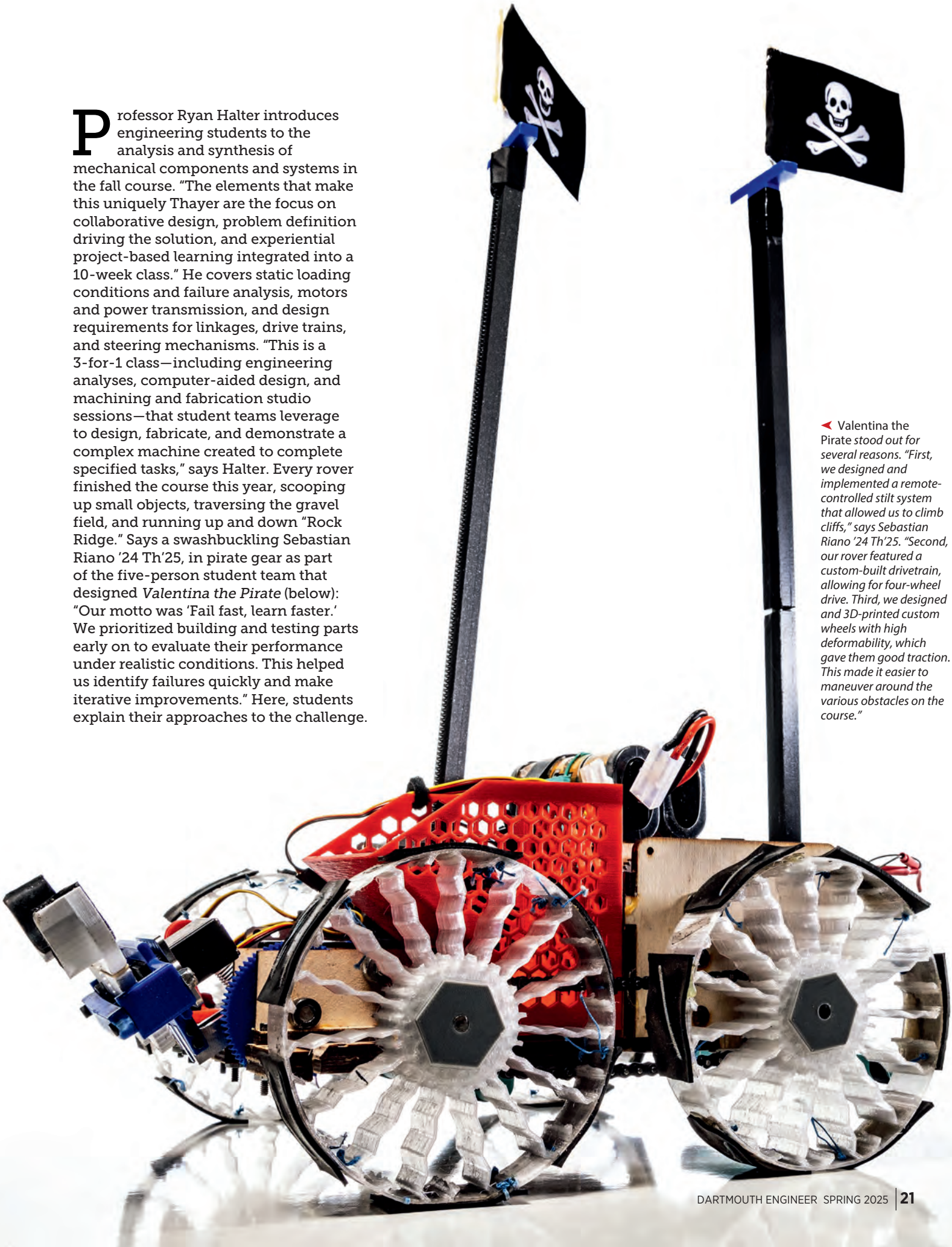
Roll Over, Rover

Seven teams. Five minutes. Countless gears, bearings, and chains. ENGS 76: "Machine Engineering" students test their designs on the obstacle course. (And yes, *Crabitron* really can do a full revolution.)

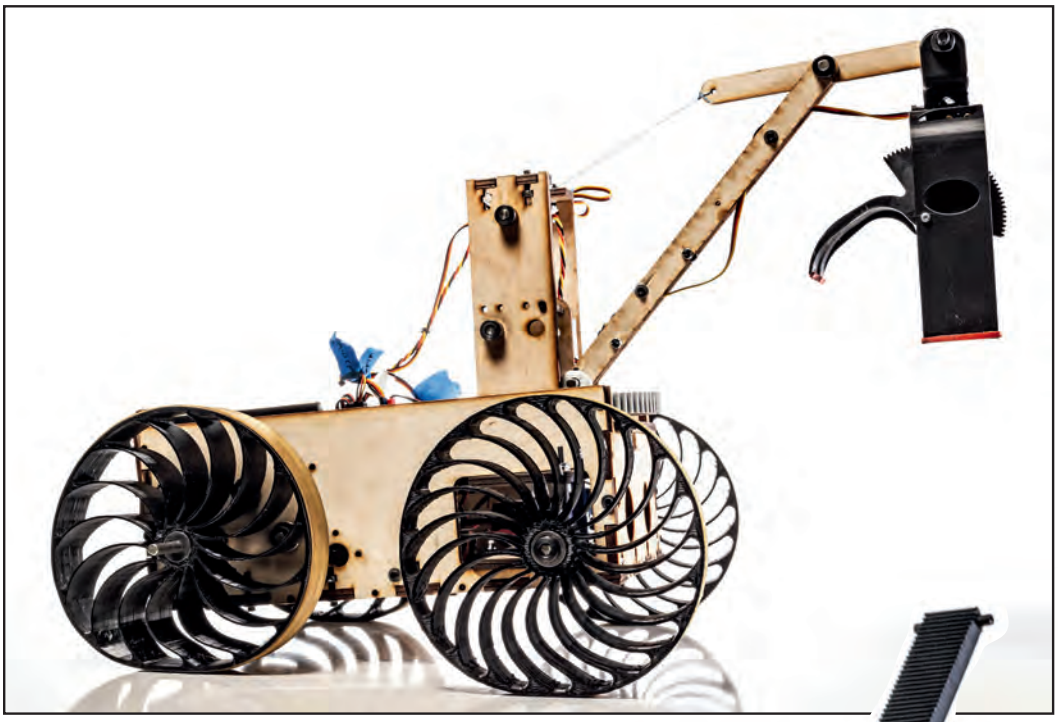
➤ Crabitron *earned cheers from spectators—and second place—with its power take-off transmission mechanism. "Using kit parts and a number of custom-built components, this transmission allowed us to power both the wheels and our virtual four-bar cliff climbing and descent mechanism using only the two motors provided," says Louis Latulippe '25.*

PHOTOGRAPHS BY ROB STRONG '04

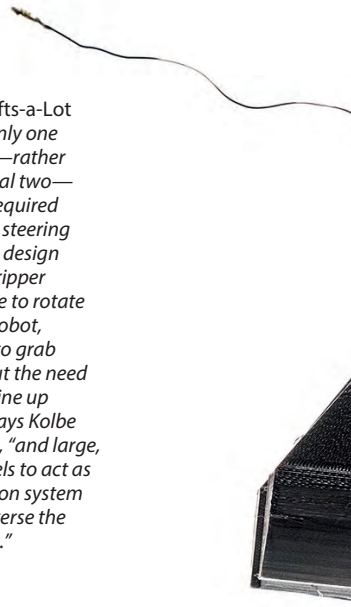
Professor Ryan Halter introduces engineering students to the analysis and synthesis of mechanical components and systems in the fall course. "The elements that make this uniquely Thayer are the focus on collaborative design, problem definition driving the solution, and experiential project-based learning integrated into a 10-week class." He covers static loading conditions and failure analysis, motors and power transmission, and design requirements for linkages, drive trains, and steering mechanisms. "This is a 3-for-1 class—including engineering analyses, computer-aided design, and machining and fabrication studio sessions—that student teams leverage to design, fabricate, and demonstrate a complex machine created to complete specified tasks," says Halter. Every rover finished the course this year, scooping up small objects, traversing the gravel field, and running up and down "Rock Ridge." Says a swashbuckling Sebastian Riano '24 Th'25, in pirate gear as part of the five-person student team that designed *Valentina the Pirate* (below): "Our motto was 'Fail fast, learn faster.' We prioritized building and testing parts early on to evaluate their performance under realistic conditions. This helped us identify failures quickly and make iterative improvements." Here, students explain their approaches to the challenge.



◀ Valentina the Pirate *stood out for several reasons. "First, we designed and implemented a remote-controlled stilt system that allowed us to climb cliffs," says Sebastian Riano '24 Th'25. "Second, our rover featured a custom-built drivetrain, allowing for four-wheel drive. Third, we designed and 3D-printed custom wheels with high deformability, which gave them good traction. This made it easier to maneuver around the various obstacles on the course."*



➤ *The* Sir Lifts-a-Lot *team used only one drive motor—rather than the usual two—which also required a traditional steering system. "Our design featured a gripper that was able to rotate around the robot, allowing us to grab items without the need to precisely line up our robot," says Kolbe Shannon '25, "and large, flexible wheels to act as our suspension system to easily traverse the rocky terrain."*

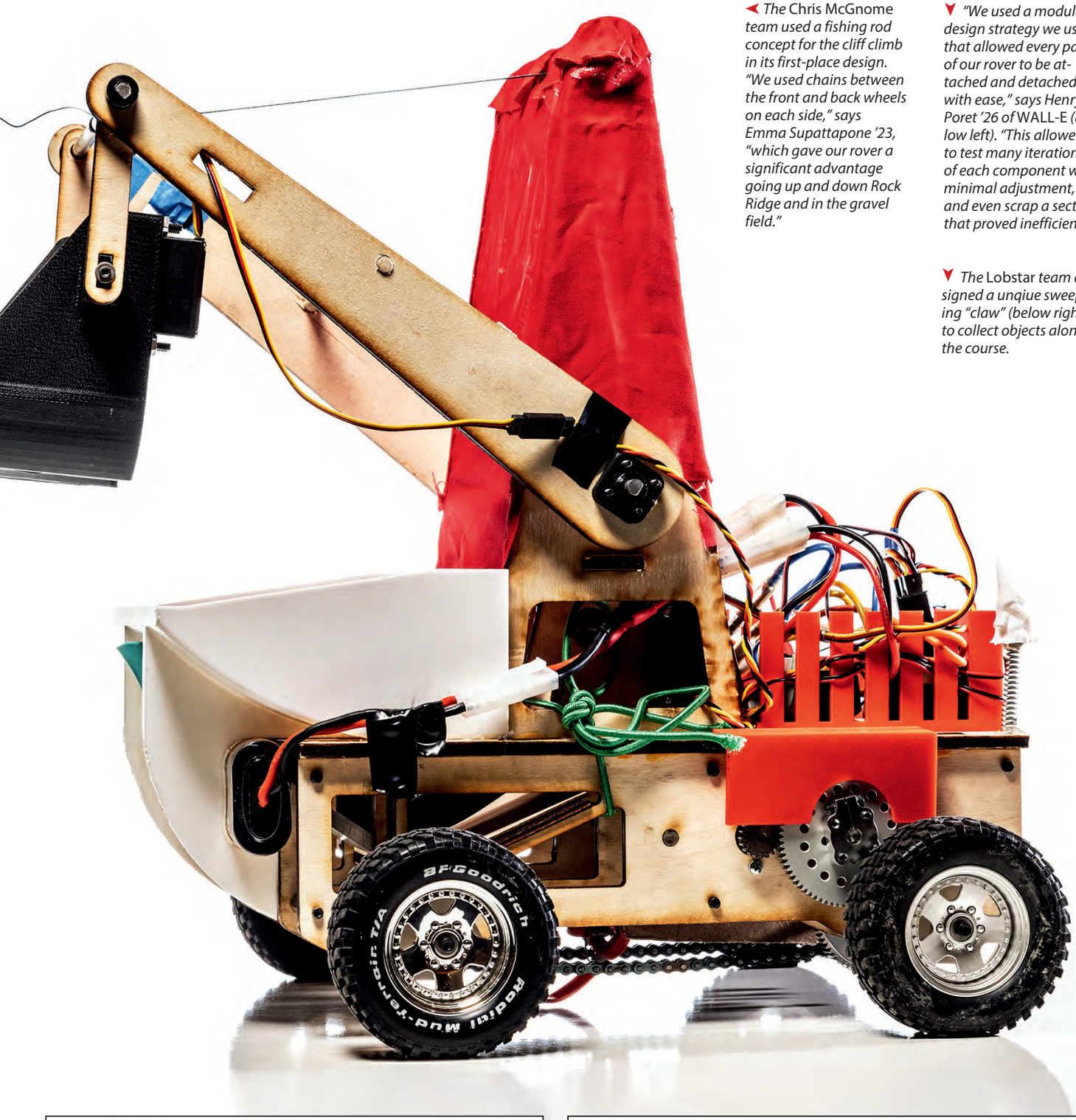


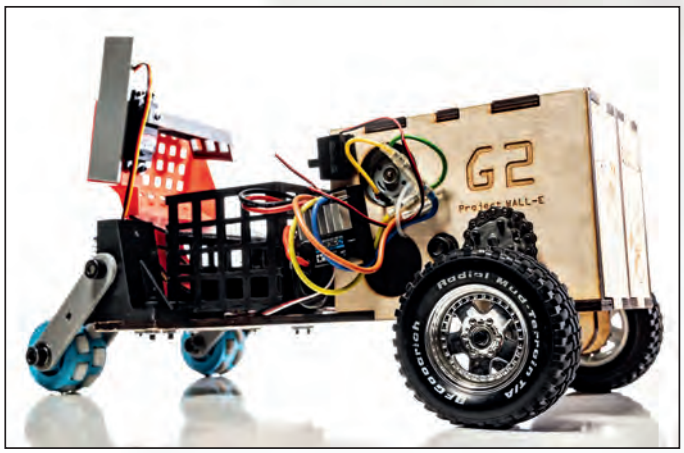
➤ *"What made* Designated Driver *unique was our commitment to simplicity without compromising functionality," says Gabriella Walsh Th'25. "Our winch design stood out because it cleverly utilized a string lasso taped to the arm, which looped around a pole and detached from the arm to pull us straight up the cliff. This innovative mechanism exemplified how simplicity in the overall design enabled creative and effective solutions."*

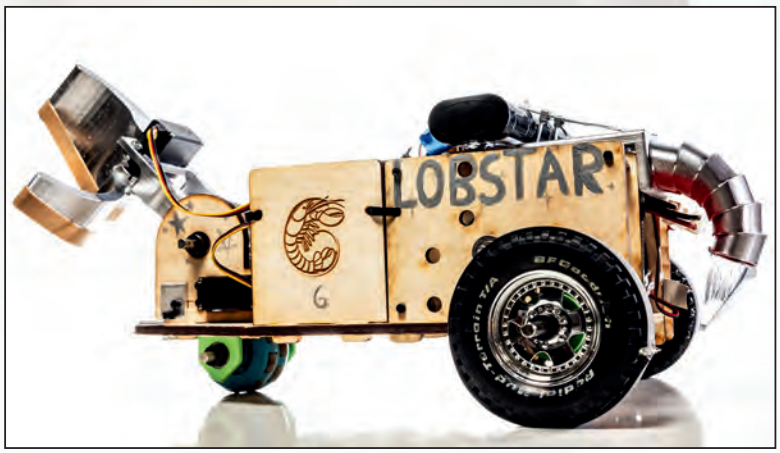
The Chris McGnome *team used a fishing rod concept for the cliff climb in its first-place design. "We used chains between the front and back wheels on each side," says Emma Supattapone '23, "which gave our rover a significant advantage going up and down Rock Ridge and in the gravel field."*

"We used a modular design strategy we used that allowed every part of our rover to be attached and detached with ease," says Henry Poret '26 of WALL-E *(below left). "This allowed us to test many iterations of each component with minimal adjustment, and even scrap a section that proved inefficient."*

The Lobstar *team designed a unqiue sweeping "claw" (below right) to collect objects along the course.*







Alumni News

FROM AROUND THE WORLD

spotlights

The Advocate

"The progress I've made from the very beginning is what keeps me motivated," **Matt Wheeler '16 Th'17** says of ongoing efforts to implement solar projects in tribal communities. Since graduation, he has introduced and implemented a range of energy projects, starting with a Willets, Calif.-based nonprofit to build residential solar in tribal communities. Then, "four years ago, I moved back home to the Navajo Nation and began working on small scale off-grid installations to power water pumps for cistern projects through Indian Health Services." As a project manager with the Navajo Engineering & Construction Authority, Wheeler designed and built a system for small-scale AC applications before handing it off to IHS. He continues to increase and develop renewable energy in tribal communities across the region as project engineer with SOLV Energy in New Mexico. "The challenges in tribal communities are substantial," says Wheeler, citing a lack of financial resources, community involvement, and politics. "While those being served are incredibly grateful, it is difficult to get projects implemented." His work has included outreach to local Native communities—"My time presenting for group projects in Thayer definitely helped"—teaching himself how to connect solar and electrical systems, and iterating to refine his prototypes. "As I move forward, I am excited to grow and push my limits," says Wheeler. "I will need to continue this progress as new opportunities will bring new challenges. [But] after experiencing the impact I had on the tribal communities of California, I committed myself to this work and it has been my sole focus since."

Matt Wheeler '16 Th'17 ▲

The Remodeler

After seven years, **Laura Weyl Th'08** has hung up her hardhat—for a few months at least. The senior associate at Degenkolb Engineers recently completed an extensive retrofit and remodel of the Transamerica Pyramid in San Francisco. "We started with a voluntary seismic retrofit, followed up with a full corrosion investigation and repair of the spire and then an extensive amenities interior remodel of more than seven floors of the building, including the lawn and surrounding park." The pyramid-shaped 48-story modernist skyscraper stands at 853 feet, and upon completion in 1972 it was the eighth-tallest building in the world. "I started scaling the spire framing before I knew twins were in my future, and they are now almost 5!" says the licensed structural and civil engineer. "The lobby and park are now open to the public, so come check it out!"

Laura Weyl Th'08 ▲

"Working with my own tribe has been the most rewarding experience."

—MATT WHEELER '16 TH'17

Young Researchers

Three Dartmouth Engineering alumni and students have earned 2024 National Science Foundation (NSF) Graduate Research Fellowships. The awards include an annual stipend and access to professional development opportunities that support fellows as they pursue research interests and make strides in their fields. Recipients include **Amritha Anup Th'23**, a PhD candidate in biomedical engineering in Thayer Professor Katherine Hixon's lab; **Mia Giallorenzi '23 Th'24**, who earned the Dart-

> **"I want to inspire wonder through movement."**
>
> —WILL JEWETT '14 TH'15

On the Job

WILL JEWETT '14 TH'15
ARTIST AND FABRICATOR

After earning an MS in digital fabrication in architecture from the University of Washington—and working in the automotive, product design, and architecture industries—Jewett last year opened Live Oak Studios in Seattle, Wash. There, he draws on skills developed within Thayer's workshops to craft original and commissioned works of sculpture and furniture out of steel, wood, and concrete.

What drew you to design?
I grew up in Houston, Texas, and spent much of my childhood on the family farm two hours outside of the city building tree forts, driving tractors, and welding things back together. While the last of those tasks generally concerned a cattle guard or a piece of farm equipment, it also included the go-cart. If we didn't occasionally fix the frame, tighten the brakes, and clean the carburetor, my siblings and I couldn't drive.

What makes your art unique?
I try to pair a delicate touch and exacting craft with an industrial aesthetic. Although pieces are often functional furniture, they are frequently of an imposing scale. The central theme of my work so far has been to recreate a playground for adults: I want to inspire wonder through movement and encourage people to be present. Right now, I'm working on a prototype for what I'm calling *Seesopposite*, a seesaw but you'll be right next to your buddy instead of across the pivot from them. Lots of design kinks to work out and a large gearbox to design before I'll have something adults can ride.

What skills from Thayer apply?
I'm using my engineering education every day. My ideas progress from sketches to small models and then on to modeling in Solidworks or Rhino/Grasshopper. Once in CAD, I'll look at them with an engineer's lens, sizing steel members using finite element analysis or tweaking the form to achieve a specific goal. For example, I used Solidworks to study the center of mass in *The Rocking Bench* [above] and found I needed to fill the front 37 inches of each C with lead shot for it to sit perfectly upright. I'm having a blast and can't wait to bring more of my ideas to life. —*Theresa D'Orsi*

mouth Society of Engineers Prize during 2024 Investiture and is studying synthetic biology as a PhD student at the University of Washington; and **Xiaoran "Seamore" Zhu '19 Th'20**, a PhD candidate studying ecology and environmental science as a member of the Land Cover & Surface Climate Group at Boston University. In addition, **Alexander Carney Th'23**, a Dartmouth PhD Innovation Fellow studying quantum engineering, earned an honorable mention. "The program is a highly competitive and prestigious award for young researchers, and we are proud of our Dartmouth fellows," says **F. Jon Kull '88**, dean of the Guarini School of Graduate and Advanced Studies. "[It] has a long history of funding students who become lifelong leaders, contributing significantly to both scientific innovation and teaching."

In Recognition

Dartmouth Engineering has named **Benton Routh '86 Th'86 Th'87** the 2024 Sylvanus Thayer Fellow for his strong commitment Dartmouth, Thayer, and the community at large. After earning his bachelor's and master's in electrical and computer engineering, the Texas native leveraged his education in consulting and marketing roles. "Even though I was in consulting, I had a technology background," Routh says. "I would say: 'I understand the engineering. I understand the math.' I credit Dartmouth's liberal arts education for giving me the ability to extend concepts and push myself throughout my career without having to go back and get a specialized degree." He served as a principal for Booz Allen Hamilton, and global executive leader at ExxonMobil, president of the petroleum marketer division and chief marketing officer at FleetCor Technologies and is currently board chair for the petroleum product firms McPherson Cos. Routh's connections to Dartmouth have remained strong throughout, including longtime service as an admission ambassador and fundraiser, now as chair of Thayer's Annual Fund Executive Committee. "When you're raising money, by definition, you're helping the students by helping run the school," he says. *—Betsy Vereckey*

Alexander Carney Th'23

"I credit Dartmouth's liberal arts education for giving me the ability to extend concepts."

—BENTON ROUTH '86 TH'86 TH'87

Emissions-Free Energy

Sarah Jewett '12 Th'13 joined other geothermal experts on campus last fall for the Class of 1972 Lecture, "The Future of Geothermal Energy." Hosted by the Arthur L. Irving Institute for Energy and Society, the panel discussion focused on advancements in technology and policy implications. As vice president of strategy at Houston-based green energy supplier Fervo Energy, Jewett has drawn on her background in hydraulic fracturing technology to create a type of "sub-surface radiator" technology. "We have produced a system that can generate clean, emissions-free energy around the clock," she said. "This is a really powerful tool as we look beyond intermittent renewables that rely on a specific resource or on the weather to decarbonize the deep fossil fuel base of our energy system." Jewett was joined by **Rosi Kerr '97**, director of the Dartmouth Sustainability Office; **Andrew McAllister '87**, who majored in mechanical engineering as an undergraduate and is now a member of the California Energy Commission; and Roger Wakeman, vice president of facilities and energy at Dartmouth. Kerr and Wakeman are leading the College's $500-million commitment to reduce campus carbon emissions by 60 percent by 2030, including a shift to hot-water heating using geo-exchange technology.

The Competitor

Engineering sciences major **Jeremy Howick '92**, part of the Dartmouth heavyweight crew that won the 1992 Eastern Sprints, recently reunited with three of his original teammates and coach Scott Armstrong for the world's biggest race, the Head of the Charles Regatta. Howick, **Dave Dragseth '93, Sohier Hall '92**, and **Elad Levy '93** sought a better finish than their ill-fated '91 attempt at the Boston regatta, when they crashed into the last bridge. Last October, the four-man crew tuned up in Hanover before heading to Boston a week later to finish 11th in the men's senior masters fours (50-plus). They raced as part of the Ever Green Boat Club—the College alumni rowing club—which included 41 men and women from 1979 through 2024 competing in six boats. "Scott Armstrong taught us to dream very big, then outwork anyone else," says Howick, who sees parallels between his athletic and professional pursuits as director of the Leicester Medical School Stoneygate Centre for Empathic Healthcare in the United Kingdom. "To succeed as the director of the centre, I've had to break new ground in the medical school, which has required me to be bold in my ambitions and vision and have a tireless work ethic to follow through."

Jeremy Howick '92 (white hat) returned to the Dartmouth docks last fall with Dave Dragseth '93, Sohier Hall '92, and Elad Levy '93.

thayer notes

1940s

Warren Daniell '48 Th'50: One of my neighbors at Newbury Court in Concord, Mass., is **George Kinzie '64 Th'65 Th'66**. We see each other often and enjoy reminiscing about our Thayer days. At 98, it's good to have such memories.

1950s

Ron Read '57 Th'58: My first job after graduating from Thayer in 1958 was with Vickers in Troy, Mich. Vickers designed and built hydraulic pumps and motors. We didn't have computer-aided design equipment, everything was done using a drafting board and T-square. But the design challenges and applications were exciting. One of our best projects was to build and install the wing-fold motors on the X-B 70.

1980s

Carrie Fraser '86 Th'87: I have been working as head of corporate marketing at Stellix. Headquartered in Foxborough, Mass., Stellix companies offer business transformation and technology consulting and engineering services to life sciences and industrial customers, with a primary focus on laboratory and manufacturing automation, data, and digitalization. I would love to hear from any other alumni involved in these areas for networking purposes (cfraser@stellix.com).

On a more personal note, my husband, **Bob Donaldson '84 Th'85**, and I recently celebrated our 30th wedding anniversary. We live in Harvard, Mass., and have three amazing adult children: one working in the culinary arts in Philadelphia, a robotics engineer who works in the AV industry in Massachusetts, and a mechanical engineer who just started his first job in Maine working for a small design firm serving the diagnostic and medical device industry.

With the engineering kids still local, I sometimes tell friends it feels like I live in an engineering fraternity, with multiple projects underway at any given time and a high-end 3D printer currently parked in the living room.

Tom Avril '89: We '89s were all highly impressed by the facilities upgrades we saw during the Cluster Reunion Reception [for '88, '89, '90, '94, '99, '03, '04, '05, and '19] last summer. I had a great time catching up with **Rob Albright '89** as well as **Rob Eleveld '89, Andy Wells '89**, and others. I recently took a buyout from my job as the science writer at *The Philadelphia Inquirer,* and I am now pursuing my long-delayed plan of writing a novel. Topic is yet to be disclosed, but it's safe to say that it's about as far removed from my Thayer School studies as possible.

1990s

Scott N. Miller '92: I recently joined a maritime defense tech startup as the chief technology officer focused on building unmanned ships designed to operate across the world's oceans. Prior to that, I ran Dragon Ventures with the goal of helping companies navigate from a prototype to production. Outside of work, I recently passed my pilot's instrument rating and had a great trip up to Dartmouth to celebrate.

2000s

Andrew Van Ness '05 Th'08 Th'09: After finishing up my MEM, I moved back to New York City, where I worked for a few different firms ranging from construction monitoring, owner's rep work, and sustainability before finally moving into mechanical, electrical, and plumbing design. I spent about 10 years focusing on large healthcare and higher education clients in and around. I earned my professional engineering license in 2016. In 2021, my wife and I left New York City to move to Northern Virginia, where she grew up. A bit of an adjustment for me as a lifelong city dweller, but our two daughters love it. I'm currently working at a large architecture and engineering firm, HDR (hdrinc.com), leading its building engineering services group here in the Mid-Atlantic. I haven't had much opportunity to get to Hanover, but I am always happy to chat with Thayer grads here in the area.

2010s

Sreevalli Sreenivasan Th'17 Th'26: I have written a children's book, *Let the Elephants Bee,* on a peaceful solution to the human-elephant conflict.

2020s

Jordan Koehler '23 Th'23: This fall, I moved to Seattle and started my PhD in molecular engineering at the University of Washington. I will be doing research rotations this year, so no set thesis yet. However, my research focus in general is drug delivery and vaccine design for infectious disease.

Harrison Munden '23: I graduated in 2023 and have spent the last year at Tesla in Palo Alto, Calif. My role is a 3D user-interface developer, and I work on all of the 3D models and 3D interactions for the Tesla mobile app. My major was engineering sciences modified with studio art, which was a perfect combo for this role. Not only am I using my technical skills from Thayer, but the liberal arts approach also comes in handy, as a huge part of my role is focused on refining the visual aesthetics of the 3D scenes.

Bishal Dev Sharma Th'24: I am a fifth-year PhD candidate in the Lynd/Olson Lab at Thayer. My research focuses on studying intracellular metabolites to develop metabolic engineering strategies that enhance ethanol production during fermentation by *Clostridium thermocellum,* a thermophilic microbe. I plan to defend my thesis this spring. My time at Thayer is one of the most rewarding experiences of my life. Beyond research, the community at Thayer and Dartmouth has truly made my journey fulfilling. After completing my PhD, I aim to transition into industrial research.

Outside of academic work, I enjoy hiking, kayaking, photography, and traveling. I recently developed a passion for pickleball and last winter I learned to ski, which I adore. I'm a strong advocate for life-work balance and have been involved with the All-Dartmouth Steering Committee for Student Mental Health and Wellbeing, supported initiatives such as Graduates in Need of Decompression (GrIND), and contributed to the Thayer Council and the Graduate Student Council. Since 2022, I have served as the first-year mentoring coordinator at Thayer and have mentored more than 40 Dartmouth students both professionally and personally. I believe kindness is an inexhaustible resource and strive to inspire others with this value.

Bryan Shea Th'24: I am the 2025 student body president of the MEM program and a proud first-generation immigrant and first-generation student. As such, I have developed town halls for students to voice their opinions and needs to program directors, created weekly social gatherings—with food from around the world—to keep the community engaged, acted as a primary tour guide to convince prospective students Dartmouth is the best place to pursue their education, and became a trained peer supporter to help students who are struggling socially and academically. I was also there for international students, showing them around the area, walking them through procedures at Dartmouth, teaching several how to drive, and taking them to get groceries.

I chose the MEM program because of the integration of the Thayer and Tuck curriculums and the sense of community that Dartmouth brings. A technical background is crucial to running a successful business nowadays. Academically, I succeeded by performing well in advanced engineering courses curated for the top engineers in the world. In my MBA courses at the Tuck School of Business, there was nothing more nerve-wracking than being called on by the vice chairman of mergers and acquisitions at Goodwin Procter LLP to structure a deal on the fly in front of my peers, many older than me and with years of

thayer notes

Gallery

1. Engineering sciences majors Tom Avril '89 (left) and Rob Albright '89 catch up during reunion in the Class of 1982 Engineering and Computer Science Center.
2. Scott N. Miller '92 recently earned his pilot's instrument rating license.
3. Andrew Van Ness '05 Th'08 Th'09, wife Corinne, and daughters Aurelia and Adelaide visit Assateague Island in Virginia, which includes a national park with wild ponies.
4. Sreevalli Sreenivasan Th'17 Th'26 has published her first children's book.
5. Harrison Munden '23 works at Tesla, where he was able to grab a seat in the Cybertruck the day it was officially released to the public.

work experience. The program fostered my ability to speak up, regardless of who I was speaking to or before. Professionally, in the MEM program I worked as a senior business operations intern at Solidworks and portfolio operations at Fidelity Investments.

Upon graduating, I look forward to applying the knowledge I have gained from Thayer and Tuck in the fin-tech industry. I will be forever grateful for the opportunities Dartmouth has provided me.

Summer Hargrave '25: During this last year at Thayer, I'm a product designer for the DALI Lab and recently joined the Cable Makerspace team. For my DALI project—which I'm completing for CS 25: "Intro to UI/UX Design II" credit—I'm working on a project called DeanHub, a dean-facing platform that allows academic deans and student affairs staff to visualize key aspects of a student's journey, consolidating all relevant information in one place to facilitate more effective advising. At the Cable Makerspace, in addition to general monitoring and training duties, I'm the onboarding project lead. We're exploring ways to improve onboarding processes and materials and finding ways to encourage students, especially newcomers, to maintain cleanliness and care in the space. Our user research focuses on surveying other student staff and students who use the space, conducting online research into makerspaces at similar universities, and speaking with program managers from those makerspaces to learn about their practices.

I'm looking to go into UI/UX design long-term, ideally living abroad in a design-focused city such as Copenhagen or Berlin! Immediately post-grad, however, I applied for a Fulbright English teach assistant position in Thailand and two Asia fellowships that would work to place me in a design role somewhere in Asia. Overall, I'm really interested in seeing design in global contexts and exploring career opportunities outside of the United States.

who wrote an undergraduate thesis last spring on identifying MCDs from STL files, achieving about a 90-percent effectiveness on a sample of 35 files.

While continuing to refine those techniques, the team is also working on a web-based tool to help law enforcement identify MCD files. "Think about how challenging it must be for law enforcement, who confiscate a stack of SD cards with thousands of files and no way to figure out if there are MCD files on them or where they came from," Diamond says. His tool could help investigators by separating out the relevant files and tracing them to their source.

A more challenging endeavor is to modify printers to prevent them from creating MCDs. As they examined the issue, team members realized the technical aspects of integrating the identification software is only part of the problem—they also had to create industry incentives to implement the technology. "In trying to understand why this hasn't been solved already," Diamond says, "we realized there is no desirable, feasible, viable solution that people want, can build, and can make money from."

In considering what would make the technology viable, the team had another breakthrough—the same technology that can help identify and prevent MCDs could also prevent printing of proprietary material. That could, in turn, provide incentives for toy manufacturers and home crafters to create higher-quality plastic items that could be protected from copyright theft.

"If you had a file format that allowed for authenticated printing, you could have a whole new economic opportunity for consumers," says Diamond. "Anyone who made a printer that was compatible with that would be able to sell the printer for more money, because you're going to be able to print the highest-quality, authenticated parts that have been professionally produced and provided, not just the freemium stuff."

Such a solution was not what the team was expecting when it started examining the issue—but it represents the best aspects of human-centered design and its essential goal to take the needs of various stakeholders into account when creating a long-lasting solution. "When we zoomed out," Diamond says, "we saw the bigger picture of re-envisioning the entire industry."

Last September, their findings received a favorable reception at a convening in Washington, DC, with representatives from the ATF, U.S. Department of Justice, and local law enforcement from around the country, as well as additive manufacturing companies and other academics. "We are extremely proud and grateful for this partnership and look forward to its success," says Dettelbach.

The team continues to build a coalition to make these solutions a reality, including with Materialise, which produces back-end software for much of the industry. At the same time, engineering students in Thayer's two-term capstone course are determining how to best implement solutions. They are also examining how teens might be enticed to create 3D-printed objects with more positive social value. "Part of the problem is that boys are finding it enjoyable to produce and play with machineguns—it's giving them social capital, it's giving them a thrill," Diamond says. "It's not just the printer—it's society and people and culture and context. The technology is just the window dressing."

All of this makes MCDs an ideal real-life case study for students learning to harness the power of human-centered design to tackle multifaceted issues—in this case, making the difference between life and death. "With this project, we are building an inspirational case study for students to see that you need the humanities and social sciences in complex technical problem solving," Korsunskiy says. "For liberal arts students who may not be sure what value they can bring to the world, we are showing that the skills they are gaining at Dartmouth are crucial."

MICHAEL BLANDING is a Boston-based journalist whose work has appeared in *WIRED, The New York Times, The Nation*, and *The Boston Globe Magazine*.

in memoriam

CHRISTOPHER G. LEVEY

— 1955-2024 —

"True Believer" in Hands-on Learning

A scientist with a passion for creating community around teaching and learning, Emeritus Professor Christopher G. Levey died from prostate cancer on September 24, 2024.

Throughout his 39-year career at Dartmouth, Levey was instrumental in embedding a project-based learning approach into engineering through space design and curriculum development. "Chris was a true believer in Thayer's unique blend of excellence in hands-on education, meaningful research, and societal impact," says Douglas Van Citters '99 Th'03 Th'06, Thayer interim dean. "He was an active materials scientist, he developed and delivered courses, he was foundational in establishing our microfabrication laboratories, and he was a physical presence in virtually every class in the curriculum with a laboratory or a project."

The director of Thayer's microfabrication lab, Levey advocated for more physical facilities to further integration across engineering and scientific disciplines. "We have the right people and the right ideas but not the right places," said Levey, who subsequently took on a central role in the development of the MacLean Engineering Sciences Center, which opened in 2006 with a glass-walled atrium providing a window—literally and figuratively—into Dartmouth Engineering's state-of-the-art project labs. The number of engineering majors soared, and Dartmouth responded by doubling Thayer lab space in 2019 and again in 2022, with Levey guiding their designs. "The instrument room, the machine shop, the materials lab, the microscopy labs, and even our new classroom designs were heavily influenced by Levey's thoughtful approach to teaching engineering through doing engineering," says Van Citters.

He developed integrated lab experiences to encourage broad understanding of complex problems and collaboration across disciplines. Within his own team, Levey earned international recognition for the world's smallest untethered mobile robot, smaller than the period at the end of a sentence. His efforts in the classroom and laboratory—including as a sponsor of research projects through the Women in Science Project—earned him Thayer's Outstanding Faculty Service Award in 2000, 2003, and 2019.

He is survived by his wife of 30 years, Barbara DeFelice, and their son, Nacio.

obits

John H. Kennedy '53 Th'54 of Mystic, Conn., died October 25, 2024. He earned his AB and master's in mechanical engineering and then served four years in the U.S. Navy and an additional 18 years in the Naval Reserve, retiring in 1978 with the rank of commander. He continued to serve Thayer School as treasurer of the Dartmouth Society of Engineers for more than 30 years and as class and club officer and fundraiser. Kennedy's civilian work experience started at Electric Boat in research & development. He formed Hovermarine Corp. with two colleagues, and in 1975 joined Yardney Electric Corp. He retired from there in 1990 and formed consulting firm Kennedy Technical Services, with primary activities funded by the U.S. Department of Energy Clean Cities Program. He is survived by wife Barbara, children John '86 and Linda and their spouses, and two grandchildren.

Roland B. Leavens '53 Tu'54 Th'54 of Selah, Wash., died August 31, 2024. At Dartmouth, he pursued his bachelor's and master's in engineering as well as an MBA from Tuck. He began his career at Diamond Fruit Growers, where he pioneered industry packaging changes and received the 1971 Outstanding Packing Man of Year Award from the Produce Marketing Association. In 1976, he became general manager of SnoKist Growers Inc. for eight years, then went to work for Food Plant Engineering. During his professional years, he was an innovator who led the development and installation of automated fruit handling and shipping systems, which initiated worldwide change in the industry. He received patents on a new packaging system and a process for preserving the color of fresh apple slices. He holds a patent for a banana packing process that he devised. He is survived by his wife, Doris, and seven children.

Louis J. Bloomfield ’58 Tu’59 Th’59 died June 2, 2024. He grew up in Shaker Heights, Ohio, and lived most of his life in the Cleveland suburbs. “Finny” (his Dartmouth nickname) was in the Tuck-Thayer five-year program and was a member of Pi Lambda Phi. After graduation, his first job was in the family business—dress manufacturing—which went out of business in 1960. He then worked for a pension-consulting firm doing actuarial work and pension administration. At night, he studied law at Cleveland State University and was admitted to the Ohio Bar in 1965. Also that year, he started a 31-year career at Progressive Insurance. In retirement, he and his wife, Jean, traveled extensively and enjoyed many Cleveland Orchestra concerts. He is survived by Jean, brother John ’56, three children, including Tom ’88, and five grandchildren.

Charles “Corky” W. Spehrley Jr. ’66 Th’67 Th’70 of Key Colony Beach, Fla., died on September 24, 2024. At Dartmouth, he was social chairman of Sigma Nu Delta, earning his AB and then BE and master’s in mechanical and electrical engineering. He joined Creare Inc. in Hanover while in grad school and continued with the engineering consulting firm upon graduation. A prolific inventor with numerous patents, he contributed to the invention of facsimile technology, patented the first ink jet printer head, and designed a mechanical heart valve, among many other breakthrough technologies. In the 1980s, he co-founded Spectra Inc. in Etna, N.H., retiring from there in 1999 and beginning a successful consulting business. He is survived by daughters Kimberly and Kristen.

Ned Foster Dripps ’72 Th’73 of Woodbury, Minn., passed away on October 31, 2024. At Dartmouth, he was active in Alpha Delta and men’s skiing. Dripps earned his AB and BE and embarked on a lengthy and successful career in construction engineering with McGough Construction Co. His work in this field showcased his dedication, expertise, and passion for engineering and analytical thinking. Later in life, he worked at Target, where he enjoyed assembling bikes for children and teaching tool skills to those younger than himself. Beyond his professional life, Ned was an avid sports enthusiast. He enjoyed skiing, fishing, golf, and bowling. A devoted Patriots fan, he also had a keen interest in college football and high school and college hockey. Ned enjoyed spending time with his family. He is survived by his wife, Kate; children Jennifer and Garrett and their spouses; Kate’s children Jill and Sam; siblings Jim, Ellen, and Carol; and 10 grandchildren.

Ihab L. Saad ’86 Th’87 of Virginia Beach, Va., died on August 8, 2024, of complications from Type 2 diabetes. Originally from Cairo, Egypt, he moved to the United States and attended Huntington (New York) High School. At Dartmouth, he competed in men’s soccer, track and field, and cross country; participated in the French language study abroad program; and earned his AB in engineering sciences and then a BE and master’s at Thayer. He went on to earn his MBA in 1991 and a master’s in international affairs in 1995 from Columbia University, then founded and served as president of Expert Logic Systems Inc. of Huntington, Fla., a cloud-based firm that harnessed “shopper bots.” His career also involved working as an assistant vice president at Union Bank of Switzerland, an associate at Booz Allen Hamilton, and a financial engineer at Mocatta Metals Corp. He is survived by sisters Irini and Iris.

| in memoriam |

PAUL A. STOKSTAD ’66 TH’67 TH’68

— 1944-2024 —

Shaped Science Education for 50 Years

Lifelong entrepreneur and educator Paul Stokstad passed away July 8, 2024.

A member of the American Association of Physics Teachers since 1965, he founded PASCO Scientific in 1964 while pursuing his AB in physics at Dartmouth and BE and ME at Thayer School. In Hanover, he was also a brother of Alpha Chi Alpha and active in student workshops. He conceived of PASCO as a science fair project, developing it in his college dorm room, expanding into the family garage, and ultimately growing it into a global leader in science education. “If I had to give myself a title, it would be ‘tinkerer,’ ” Stokstad, president of the Roseville, Calif.-based firm, told the *Sacramento Business Journal* in 2014.

Since the introduction of Stokstad’s first product, the Millikan Oil Drop Apparatus, PASCO has advanced to support educators and students in more than 100 countries. He began with apparatus for physics and engineering labs; branched out to include sensors, interfaces, and data collection and analysis software; and most recently developed interactive textbooks. “Anywhere we see an opportunity to put modern tools in the hands of science educators and students,” he said, “we develop the best products in the market to fit that need.”

That determination helped PASCO earn three 2023 Best of STEM Educators Pick Awards, for the digital resources in PASCO Academy, a meter stick optics system, and introductory Coding with Vehicle Sensor Technologies Kit. Stokstad also worked with ministries of education to transform science learning for entire countries and developed hands-on tools for science and engineering programs at universities and colleges around the world.

Under his leadership PASCO was a strong supporter of American Association of Physics Teachers for decades, exhibiting at meetings and sponsoring workshops and events at the winter and summer meetings, including the annual Apparatus Competition. He was also an active Thayer alumnus, serving as a longtime fundraiser and as a member of the Dartmouth Society of Engineers Executive Committee.

He is survived by Shelley, his wife of almost 30 years.

Collaborations

"The goal is to avoid unnecessary injury to the patient."

—PROF. KIMBERLEY SAMKOE

Professors Halter (from left), Paulsen, and Samkoe focus on imaging interventions.

CATHA MAYOR

A Precise Surgical Solution

A Dartmouth Engineering-led team has earned a $31.3-million commitment from the Advanced Research Projects Agency for Health to create a laparoscope-integrating imaging solution that can improve surgical outcomes, particularly for prostate cancer.

Led by Professors Kimberley Samkoe, Scott Davis, Ryan Halter, and Keith Paulsen, the team will use nerve and vascular contrast agents to cause these critical anatomical structures to fluoresce, then map and visualize the 3D shape and depth of the structures. "It's currently not possible to image these subsurface structures in real time," says Samkoe. "The goal of the project is to be able to identify and locate the structures such that surgeons can make rapid intra-operative decisions to avoid unnecessary injury to the patient."

The effort builds on Dartmouth's experience with biomedical engineering innovations in optical imaging, visualization, and surgical interventions for clinical translation. The engineering team is collaborating with researchers at Dartmouth Health, QUEL Imaging (a Dartmouth startup cofounded by Ethan LaRochelle Th'20 and Alberto Ruiz Th'22), Johns Hopkins University, Oregon Health and Science University, Intuitive Surgical, and Trace Biosciences. —*Catha Mayor*

IN THE NEWS

"Biden Awards $150 Million in Research Grants as Part of Cancer 'Moonshot' "

The New York Times

The awards are to be made through the Advanced Research Projects Agency for Health (ARPA-H), which is aimed at driving biomedical innovation. Recipients included Dartmouth, Johns Hopkins, and the University of California.

"Dartmouth Students Help Lebanon Plan for E-Bike Chargers"

Valley News

Engineering students Avery Moorhead '25, Nathan McAllister '25, Gannon Forsberg '25, and Grace Connolly '25 are helping bring public electric bicycle charging to nearby Lebanon, N.H.

"Considering the Case for Hydrogen Home Heating"

Time

Outgoing Dean Alexis Abramson writes about the potential of using hydrogen for heating buildings: "Electric heat pumps powered by clean electricity will play a significant role in decarbonization of the grid."

"Viral Activation Can Shape Breast Milk Composition"

The Scientist Magazine

Professor Britt Goods Th'11 is featured in an article about how the composition of breast milk changes with a CMV infection. "This study is a really good example of where the field is moving, as something that helps us determine what questions we should be asking next," Goods said.

@thayerschool

The reel from last term's ENGS 21: "Intro to Engineering" projects—including this plant pot that measures soil temperature and moisture—went viral with 2.3 million views.

Video Tour

Explore Dartmouth's West End with engineering sciences major Supriya Ganti '25 as she takes you on a tour of the campus and facilities that are home to Thayer School of Engineering at Dartmouth.

youtu.be/Yf9UYkFEuyk

facebook.com/thayerschool

PhD student Ene Michelle Igomu (left) attended the National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM), representing Thayer. There, she met Dr. Sandra Johnson, who shared her journey to becoming the first Black woman to earn a PhD in computer engineering in the United States.

DARTMOUTH ENGINEERING

DARTMOUTH COLLEGE
15 THAYER DRIVE
HANOVER, NH 03755

NON-PROFIT
U.S. POSTAGE
PAID
DARTMOUTH COLLEGE

The Adventure Begins

Photographer Savannah Byron, a PhD Innovation Program student, captures the ascent of the fall first-year grad student trip up Mount Moosilauke, Dartmouth's own 4,802-footer.