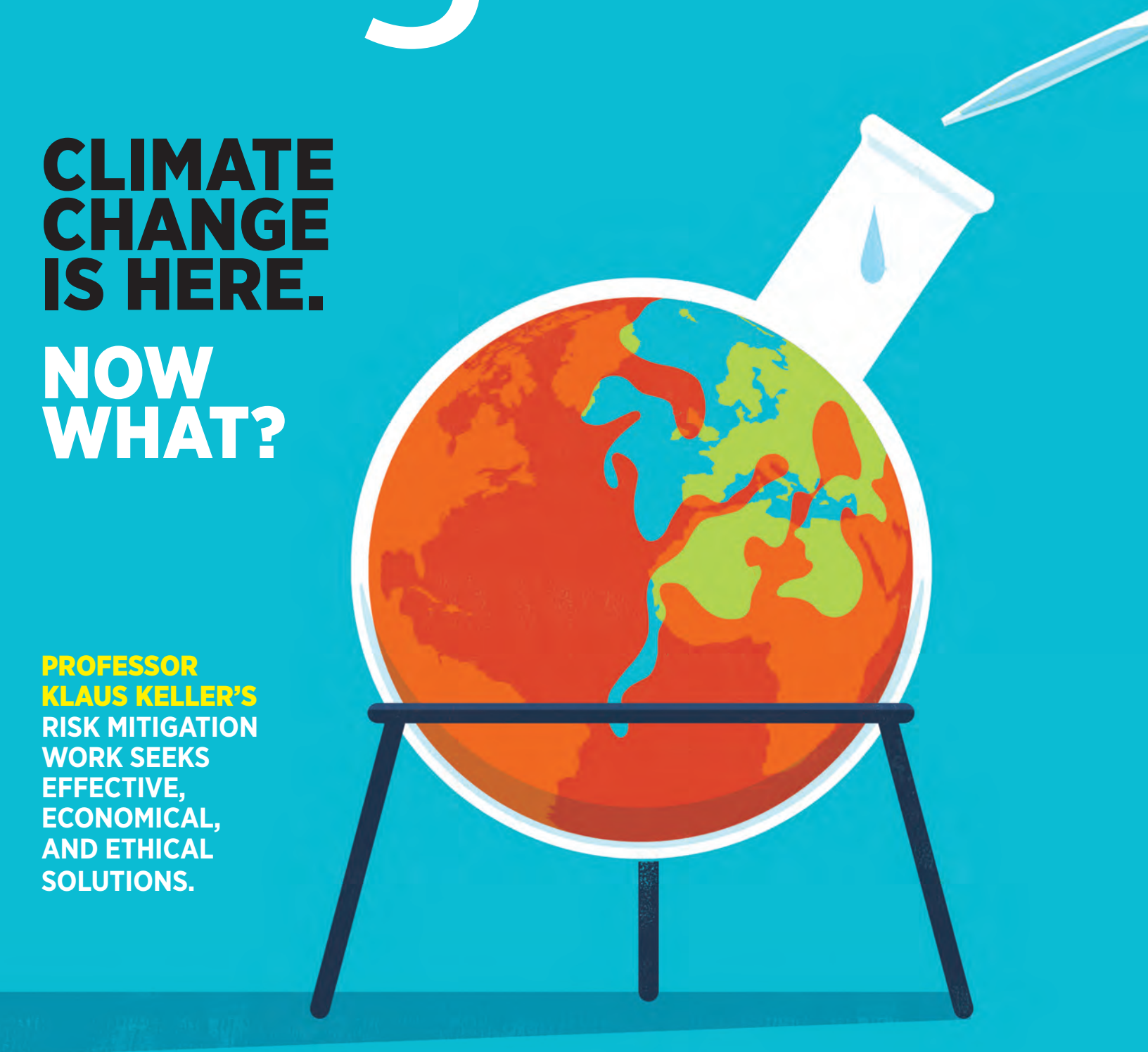
DARTMOUTH
Engineer
THAYER SCHOOL OF ENGINEERING | FALL 2022

CLIMATE CHANGE IS HERE.

NOW WHAT?



PROFESSOR KLAUS KELLER'S RISK MITIGATION WORK SEEKS EFFECTIVE, ECONOMICAL, AND ETHICAL SOLUTIONS.

inside

First Look

BONFIRE SAVE

Back in 2018, when faced with the prospect of losing the permit for Dartmouth's Homecoming bonfire due to ongoing safety issues, the College turned to engineering Professor Doug Van Citters '99 Th'03 Th'06 to help save a long-cherished tradition. "The re-engineered bonfire had to not only be appropriate for students to build while retaining its majesty but also fall in a more predictable fashion, despite nature's unpredictability," says Van Citters. He built prototype after prototype to arrive at the current model. During the last week of October, for the fourth consecutive year, students followed Van Citters' bonfire manual to stack 290 6-inch-by-8-foot timbers to a height of 28 feet, with an additional 8 feet of first-year class numerals at the top, and fill the center with 650 pallets. The result? Another bonfire to collapse safely, as predicted. "Homecoming is bigger than any one experience, and this tradition is an example of building community," says Van Citters. "Also, nobody can beat me at Jenga anymore."

Photograph by Christopher P. Johnson

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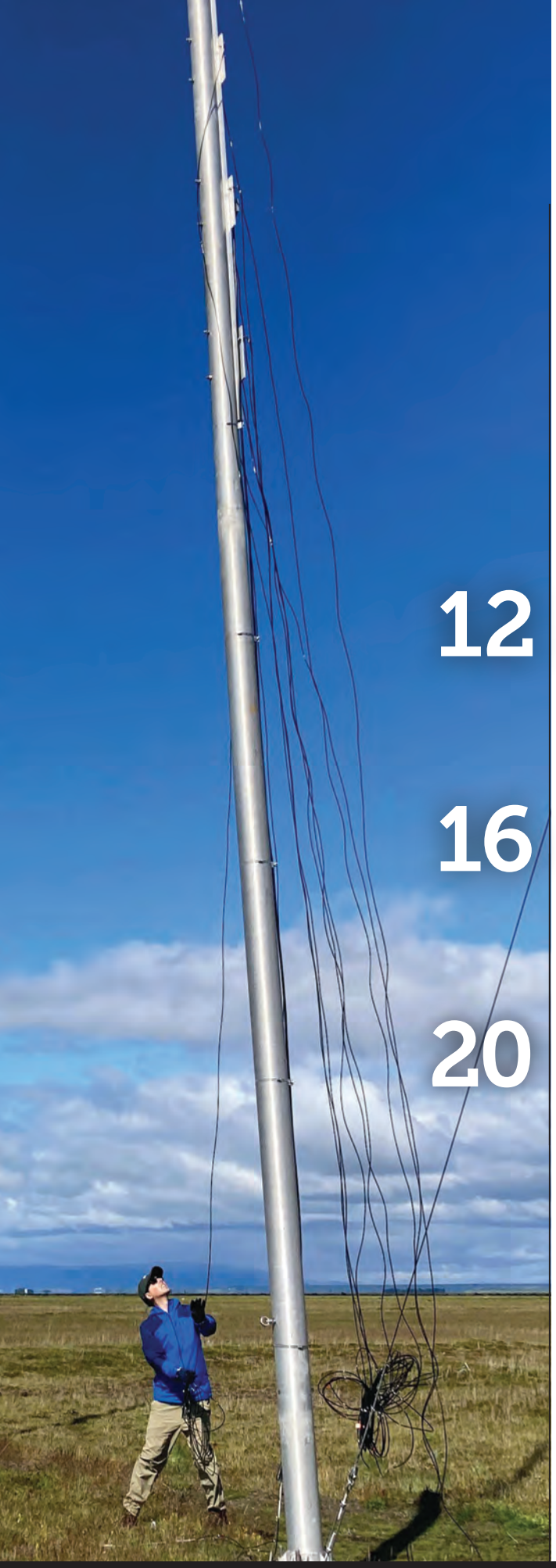
Research scientist Evan Thomas unfurls stabilizing cables on an antenna support pole as part of Professor Simon Shepherd's SuperDARN build team.
Photo by Nat Alden '23



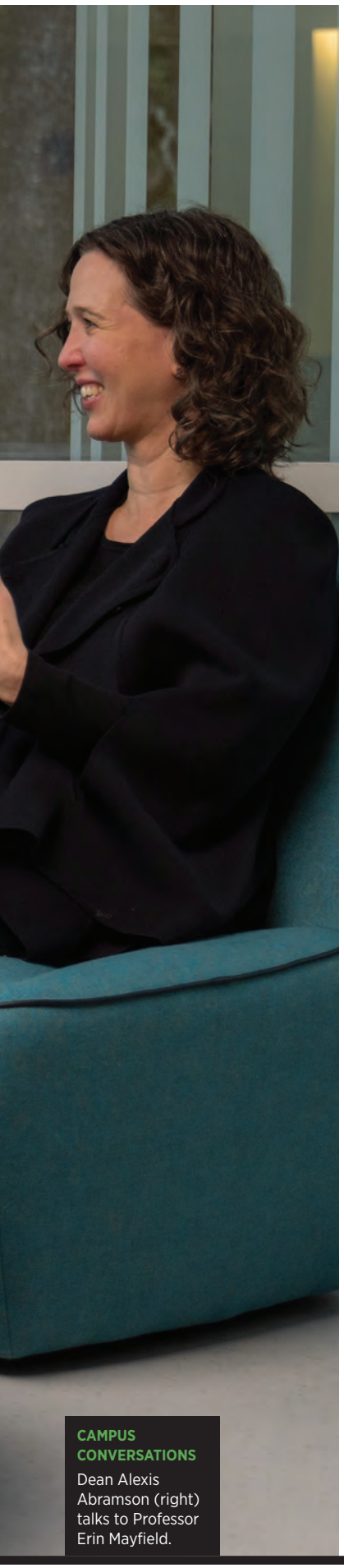
COVER ILLUSTRATION BY CHRIS GASH

DEPARTMENTS

"You have to get up every day and try to work toward a solution and don't give up. Because that's not an option."

—PROFESSOR ERIN MAYFIELD

Leading Thoughts



CAMPUS CONVERSATIONS
Dean Alexis Abramson (right) talks to Professor Erin Mayfield.

From Climate Science to Climate Policy

Dean Alexis Abramson speaks with Professor Erin Mayfield about her work shaping U.S. energy legislation.

Last August, as the U.S. Congress passed the nation's most significant climate change infrastructure legislation to date, I knew I had to talk with Professor Mayfield, whose rapid energy modeling work directly informed the Inflation Reduction Act (IRA). A specialist in energy systems and modeling, she shares how her team shaped important provisions in the almost $370-billion investment in energy security and climate change programs.

Tell us more about your work and its role in the policymaking process for the IRA.

MAYFIELD: I was part of two large modeling studies. One was Net-Zero America, in which we tracked pathways to net-zero emissions. The second, which I co-led, was REPEAT [Rapid Energy Policy Evaluation and Analysis Toolkit], which we set up in advance knowing that legislation was coming down the pipeline. In real time, we modeled legislation and briefed people on the Hill about our findings, including potential impact on air pollution, labor, and affordability. We also helped do some analysis of specific provisions and how those can be better designed.

Walk us through one of those provisions. What was considered? What were the variables?

MAYFIELD: It's not just about driving down costs, it's also about having a labor force to actually build out the infrastructure we need to help reduce emissions. With respect to labor, we helped look at different tax credit "adders" you could tack onto existing credits to ensure fair wages and help retain a workforce that looks like the population where infrastructure is built.

From the perspective of an engineer and scientist, how big a deal is this legislation?

MAYFIELD: It's momentous. To contextualize, there was no way we were going to meet our emissions targets before, and now, this brings us closer. Our modeling shows a 40-percent emission reduction by 2035. That doesn't get us to 50 percent, but it gets us close. And that's just through public investment. It doesn't include private investment motivated by the IRA and the additional impact from private industry goals because of the federal legislation. I'm also passionate about the equity and justice provisions. In the past, equity was an ancillary factor in how U.S. environmental policy was designed. In this legislation, there's specific justice and equity objectives, not just outcomes—and that's unprecedented.

That connection between climate policy and equity seems relatively novel. What has been the catalyst for us to think about legislation differently?

MAYFIELD: There are a few things in play. One is society's broader consciousness of inequities that I feel has been growing through the past couple of years. There's also the political layer. The deciding vote on the legislation was a senator in a coal state, right? So, there was a political side to adding provisions that benefit people who live in coal communities. The passage of the IRA, that's a huge bright spot. From my perspective, you have to get up every day and try to work toward a solution and be tenacious and don't give up. Because that's not an option.

When you think about the future, what gives you and your students a lot of hope?

MAYFIELD: I think students get excited about my work because it's focused how you can problem-solve to find solutions. It makes climate change less an intangible thing that we can't do anything about and more something where we can iterate to make small changes in all these places and contribute, in aggregate, to solve the whole problem. Students are both optimistic and concerned—they know that climate change is a huge problem, that it's going to affect the world and disproportionately impact developing countries and disadvantaged areas. I'm inspired by our students and their enthusiasm for not just finding but also being part of the solution.

PHOTOGRAPH BY ROB STRONG '04

THE Great Hall

NEWS FROM AROUND THAYER SCHOOL

ROB STRONG '04

"It's a unique opportunity for Dartmouth to support students and postdocs doing cutting-edge research."

—PROFESSOR GEOFFROY HAUTIER

CLEAN ENERGY

Transforming Clean Energy Technology

DARTMOUTH ENGINEERING PROFESSORS ARE PART of a $540-million U.S. Department of Energy push to advance clean-energy technologies. The roughly $3.5-million award to Professors Geoffroy Hautier and Jifeng Liu will drive efforts to discover new photovoltaic materials and enable each to join one of two Energy Frontier Research Centers (EFRCs) investigating clean hydrogen production and more energy-efficient computing.

"It's a boost for our materials science studies at Dartmouth because it's enhancing research on renewable energy and energy efficiency," says Liu, "and connecting real-world challenges in the next generation of energy harvesting to fundamental materials science."

Hautier will lead the photovoltaics project with Liu as a co-investigator and is quick to point to the potential for collaboration. "These are teams that are funded, not one single lab, so we can bring a lot of different expertise together to solve these problems," he says. "It's a unique opportunity for Dartmouth

"Students will learn how to tackle problems and not be afraid of them."

—PROFESSOR JIFENG LIU

to support students and postdocs doing cutting-edge research in problems society is facing today in terms of not only producing energy in a cleaner way, but also using energy more efficiently," he says.

That collaborative nature forms the basis of the professors' photovoltaics partnership. "I've started working on the computational aspect, and Jifeng works more on the experimental side and so, of course, we started talking and having ideas about what we can do together," says Hautier. The focus of their work is to find new photovoltaic materials for solar cells. "The idea of photovoltaics is basically using light to produce electricity," says Hautier. When light shines on a photovoltaic material, it generates free electrons—which can then move and form an electric current—and "holes" where the electrons used to be. Many materials' electrons and holes want to come back together—which wastes the light energy. "The focus of this project is to find materials that will minimize this process of recombining," he says, "which is essential to making efficient solar cells."

In addition to his photovoltaics work, Liu is a co-investigator and executive committee member with the Manipulation of Atomic Ordering for Manufacturing Semiconductors (μ-ATOMS) EFRC, led by the University of Arkansas. Liu and the μ-ATOMS team will study what determines the ordering of atoms in semiconductor alloys, toward more energy-efficient computing. At another EFRC—the Center for Electrochemical Dynamics and Reactions at Surfaces (CEDARS) led by North Carolina Agricultural and Technological University—Hautier will investigate water-splitting catalyst design for clean hydrogen production.

—Catha Mayor

IMAGE COURTESY UNITED AIRLINES

"The technology for fast, safe, affordable flying cars is here."

—PROFESSOR VIKRANT VAZE

OPERATIONS RESEARCH

A Network Plan for eTaxis

IF THEY BUILD THEM—ELECTRIC VERTICAL-TAKEOFF-AND-landing (eVTOL) vehicles—will people come? Professor Vikrant Vaze believes the answer is a qualified yes.

"The technology for fast, safe, affordable flying cars is here," he says, "but if we don't plan it right, if we don't understand how, when, and where customers will want to use them, then the industry will fail before it even gets started."

This fall, United became the first major airline to publicly invest in two eVTOL vehicle companies, paying $10 million to California-based Archer Aviation for 100 four-seat vehicles and $15 million to Brazil-based Eve Air Mobility for 200 more. It expects the first deliveries by 2026 and claims the cost of taking a flying taxi will be about the same as an Uber Black.

Contrary to ride-sharing services such as Uber, however, eVTOL taxis will require a dedicated network of special landing pads, called vertiports. Such specialized infrastructure must be carefully planned, Vaze and his team argue, using network optimization methods to create an accessible, affordable urban aerial mobility (UAM) system. "The survival of the flying car business may depend as much on sophisticated network planning driven by operations research and analytics, as it does on innovative vehicle technologies," he says.

Vaze lays out his research as coauthor of "Vertiport Planning for Urban Aerial Mobility: An Adaptive Discretization Approach," published in September in the INFORMS journal *Manufacturing & Service Operations Management*. "Our findings suggest that UAM operations would benefit from consolidation," he says, "and that eVTOL vehicles would more naturally serve relatively longer commutes rather than replace ground taxis and ride-sharing."

—Catha Mayor

farewell

Longtime faculty Eric Hansen and Christopher Levey retired this year.

When Hansen (above) joined Dartmouth engineering faculty in 1979 and began teaching electrical engineering in the early 1980s, the tech world was captivated by the debut of the personal computer and the intricate microprocessors that made them possible. He developed—and redeveloped—the digital electronics course many times over as technology advanced. Hansen most recently served as the director of the dual-degree program, where he oversaw a partnership with 20 liberal arts colleges for students studying engineering at Dartmouth.

Levey (left) joined the Dartmouth faculty in 1986 and oversaw both labs and projects spaces that exemplified hands-on, project-based learning at Thayer. He was the director of safety and instructional laboratories since 1998, overseeing Couch Project Lab and the Machine Shop and guiding the space use and design of the MacLean Engineering Sciences Center and the new Class of 1982 Engineering and Computer Science Center. In the Microengineering Laboratory, he and his team were the first to develop the world's smallest untethered mobile robots.

WELCOME

Three New Faculty

Dartmouth Engineering welcomed three new faculty—Professors Eric Bish, Peter Chin, and Mattias Fitzpatrick—during the summer term.

ERIC BISH

Associate Professor of Engineering

ERIC BISH

For the past five years, Bish has served as visiting associate professor at Thayer, where he has taught MEM courses "Technology Assessment," "Introduction to Optimization Methods," and "Technology Project Management" and advised on individual final projects. His expertise spans a broad array of topics, including computational fluid dynamics, fluid and thermal sciences, and engineering management. His extensive career has included positions with Hypertherm and Ansys in Lebanon, N.H. He earned his bachelor's in aeronautical engineering from Ohio State University and his MS and PhD in aeronautical engineering from the University of Michigan.

PETER CHIN

Professor of Engineering

PETER CHIN

As director of the Learning, Intelligence + Signal Processing (LISP) Lab, Chin and his students are investigating fundamental questions—such as whether intelligence be learned—at the intersection of signal processing, machine learning, game theory, differential geometry, extremal graph theory, and computational neuroscience. He is an associate editor of *IEEE Transactions on Computational Social Systems* and has served as cochair of the annual SPIE/DSS Conference on Cyber Sensing and symposium chair of the GlobalSIP conference. He earned his bachelor's in electrical engineering, computer science, and mathematics from Duke and his PhD in mathematics from MIT.

MATTIAS FITZPATRICK

Assistant Professor of Engineering

MATTIAS FITZPATRICK

Fitzpatrick's research focuses on quantum engineering and quantum sensing using superconducting circuits. He graduated with a bachelor's in physics and mathematics from Middlebury College and completed his PhD at Princeton with a focus on the design and construction of large-scale one and two-dimensional circuit QED lattices. There, he received an Intelligence Community postdoctoral fellowship to work on quantum sensing and was awarded a distinguished teaching award for the design and implementation of a course on electricity, magnetism, and photonics. After his fellowship, he went on to work on quantum computation at IBM's Thomas J. Watson Research Center.

FAR LEFT, TOP: DOUGLAS FRASER; FAR LEFT, BOTTOM: MAYELLEN MATSON

PATENT Professor Emily Asenath-Smith, here with interns and engineering students Hayden Barry '25 (left) and James Quirk '25, has been awarded U.S. Patent No. 11,298,689.

DAVID MARQUIS

Making Water Safer

PROFESSOR EMILY ASENATH-SMITH HAS DEVELOPED new materials that use solar energy to remove harmful dissolved contaminants from water. "Water is key to all life and has been a passion of mine for years," she says. "There is little, if any, uncontaminated water left on our planet, and many of these contaminants are not removed by traditional water treatment methods."

Her team, which included Dartmouth graduate student Emma Ambrogi, developed a material with components that respond to ultraviolet, visible, and near-infrared regions of light. This means a larger portion of the solar spectrum can be used to break down contaminant molecules into benign byproducts. Asenath-Smith's low-energy solution, "Multi-spectral photocatalytic compounds," was awarded U.S. Patent No. 11,298,689 this spring. Invented at the U.S. Army Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, where the research materials engineer splits her time, the new material has far-reaching potential in multiple scenarios. "The U.S. Army needs robust, low-cost systems to enable them to reuse 100 percent of their water for operations in remote and contingency locations," says Asenath-Smith. "Such water resources are critical to successful missions of our military all over the globe."

Her next steps: "To realize its full potential, the material needs to be integrated into a device, which would allow effluent water to contact the invented material so that contaminants can be degraded." Key to the project's future success, Asenath-Smith says, is teamwork. "With the right team, you can solve huge challenges and have fun along the way."

10 hub partners will support entrepreneurship in rural communities from New Hampshire to West Virginia.

PARTNERSHIP

New I-Corps Hub Supports Innovation in Rural Regions

DARTMOUTH ENGINEERS HAVE joined nine universities to form a new National Science Foundation (NSF) funded effort to bring education and workforce training to rural, economically underserved communities. It will "empower our students and scholars with entrepreneurial skills for the successful transfer of new discoveries and inventions out of our labs and into the market and hands of the people who need it most," says Eric Fossum, professor and vice provost for entrepreneurship.

The Interior Northeast Innovation Corps (I-Corps) Hub will launch in January with $15 million in funding to serve a region stretching from New Hampshire to West Virginia. It's part of a nationwide hub network designed to restore economic vitality to areas that have seen the decline of manufacturing and extracting industries.

Dartmouth joins Rochester Institute of Technology, SUNY Binghamton, SUNY Buffalo, Syracuse University, University of Pittsburgh, University of Rochester, University of Vermont, West Virginia University and hub lead Cornell University. Each institution will host regional I-Corps courses and contribute to programming and curriculum strategy.

It is an effort that builds on Dartmouth's success supporting innovation through the Magnuson Center for Entrepreneurship and the I-Corps Sites program, funded by the NSF since 2016 to support promising technologies arising from campus research. The program has enabled faculty, students, and researchers to launch startups stemming from research in College laboratories—ranging from technologies that focus on women's health to rapid diagnostic tools for infectious diseases. "It has been an important driver of startup formation," says Professor Laura Ray, an I-Corps investigator, "supporting more than 90 teams comprised of more than 200 individuals in defining their value proposition and customer."

CAPSTONE

Analyzing Energy Use in Cannabis Cultivation

FIELDWORK Jason Carpio '22 Th'22 conducts research at Culta for his team's project, "Radically Efficient Cannabis Cultivation Facility."

COURTESY DARTMOUTH STUDENT SUSTAINABLE CANNABIS TEAM

IN THE FIRST-EVER INDEPENDENT STUDY OF ENERGY EFFICIENCY in the cannabis industry, a team of engineering students revealed the potential to reduce energy demands and greenhouse gas emissions by more than 50 percent.

The Dartmouth Student Sustainable Cannabis Team—Jason Carpio '22 Th'22, Jack Firestone Th'22, Clara Hahn '22 Th'22, Griffin Lehman '22, Grace Qu '22 Th'22, Ivy Yan '22 Th'22—adopted a "whole-system" approach to analyze data from cannabis operator MariMed Inc. and seed-to-sale company Culta. The effort was part of their capstone BE design sequence ENGS 89/90: "Engineering Design Methodology & Project Initiation/Completion" and was sponsored by the Sustainable Cannabis Coalition and Rocky Mountain Institute.

The research provides enormous potential for the industry to reduce capital and operating costs while improving key metrics such as grams of product per kilowatt hour and gram of CO_2 emission, says Stephen Doig '82, project advisor. "The students found that operators using LED lights can reduce energy use by 50 percent, with even greater savings for those using high-pressure sodium systems."

The students considered drivers of optimal plant growth (such as water, temperature, and light) as well as heating and humidity loads that can vary by tenfold across the day-night cycle. They explored active and passive options and analyzed grow lights, humidity, and temperature control systems to deliver a range of insights.

"Regulators and grid operators should applaud the results," says Doig, "since widespread industry adoption will lower peak demand on the grid and provide guidance on key metrics to compare operators across the industry."

Kudos

SUPPORTED The National Science Foundation awarded **Michael James May Th'25** a graduate research fellowship of $46,000 to support his geophysics and engineering research in the Arctic and Antarctic.

NAMED Engineering sciences major **Katherine Lasonde '23** and biomedical engineering major **Nicholas Sugiarto '23** have been named Goldwater Scholars. The competitive program supports students who show "exceptional promise of becoming this nation's next generation of research leaders" with up to $7,500 toward their research.

PITCHED Conrades Distinguished Fellow and MEM candidate **Tishya Srivastava** won a $10,000 Build Prize at "The Pitch" competition for her app, MEMRY, designed to increase engagement between Alzheimer's patients and caregivers.

SELECTED Engineering sciences major **Karson Smith '25** is one of just five students nationwide to receive a $10,000 Hyundai Women in STEM scholarship for her commitment to sustainability in her field.

FUNDED NASA awarded a $750,000 grant to **Professor Yan Li** and her team—PhD students **Huan Zhao** and **Xiangbei Liu** and Luce Fellow **Anisia Tiplea '24**—to design new materials for self-powering sensors that can withstand high temperatures.

EARNED **Cameron Wolfe '23** has earned the 2022-23 Mazilu Engineering Research Fellowship to support his work with **Professor Laura Ray** on applications of machine learning and controls.

PUBLISHED **Ryan Chapman Th'18** and **Professor Doug Van Citters** published their research on using wearable devices to track shoulder rehab as coauthors of "Using Inertial Measurement Units to Quantify Shoulder Elevation after Reverse Total Shoulder Arthroplasty" in *ScienceDirect*.

NAMED Engineering major **Lindsay Harley '24** has been named a Stamps Scholar. She plans to use the scholarship to pursue summer enrichment math in the context of sustainable engineering with **Professor Vicki May**.

PUBLISHED PhD students **Md Saifur Rahman, Julia Huddy**, and **Andrew Hamlin**, with **Professor William Scheideler**, have published their research on "Broadband mechanoresponsive liquid metal sensors" in the August issue of *npj Flexible Electronics*.

NAMED MEM candidate **Srishti Chaudhary** has been named Nutanix Advancing Women in Technology Scholar. One of two chosen in the United States, she will receive up to $10,000 to apply her "passion for technology while advancing women in the field."

PROFILED **Dean Alexis Abramson** was featured in *Authority Magazine*'s "Lessons From Inspirational Women in STEM and Tech" series and discussed "instilling human values in tech education" with *Insider Intelligence*.

HONORED Thayer research associate **Kasia Warburton** won the 2022 Institute of Physics Early Career Lecturer Award for her talk on "Subglacial Soft Matter" at the 6th Edwards Symposium on Soft Matter for the 21st Century.

PUBLISHED PhD student **Andrew Pike** is coauthor of "Unlocking the thermoelectric potential of the Ca14AlSb11 structure type," published in September in *Science Advances*.

SELECTED Professors **Jiwon Lee, Colin Meyer**, and **Liz Murnane** have each earned a $250,000 Neukom Institute CompX Faculty Grant to support development of novel computational techniques and the application of computational methods to their research.

TEAM EFFORT

Energy Awareness by Design

"We liked the idea of something eye-catching to get people to pause."
—AVERY HORMAECHEA '24

Student artists (from left) **Cammy Lee '22, Alessa Lewis '22, Harrison Munden '23**, and **Sam Miller '24**—plus **Michelle Chen '22, Ekene Duruaku '22**, and **Leah Ryu '22**—created a mural to raise community awareness of energy-efficiency features of the new Arthur L. Irving Institute for Energy and Society. Engineering sciences student Munden had never worked on a mural before but had an interest in sustainable buildings. "The mural really brightened up the space, and it was fun watching people's interest get piqued when passing by it," he says. The goal of the design was to make the energy efficiency of the building more visible, says curator **Avery Hormaechea '24**: "We liked the idea of something eye-catching to get people to pause." Recently completed in Dartmouth's West End District, the Irving Institute is expected to earn LEED platinum certification, the highest award for building energy performance. In addition to triple-glazed windows and rooftop solar panels, the building features a glass facade that stimulates air movement for ventilation without fans, automated window shades to regulate temperature and air flow, and water-based systems with 1,000-times greater capacity to heat and cool than air-based systems." *—Betsy Vereckey*

AVERY HORMAECHEA

"It's not just that climate change is getting worse, it's also how humans interact with it."

—KLAUS KELLER

Bridge Builder

BY MICHAEL BLANDING

Climate change is no longer a threat—it's here.

Although scientists can help model its impact and engineers can develop technologies to help us adapt, what's missing is the connection between them.

Klaus Keller brings together researchers, decision-makers, and communities to create smarter, more equitable solutions to climate change.

PHOTOGRAPH BY ROB STRONG '04 • ILLUSTRATION BY CHRIS GASH

"Models are not value-free.

It's important to be reflective and transparent about the ethical choices you are making."

—PROFESSOR KLAUS KELLER

The height of a levee is a fixed number—5 feet, 6 feet. Determining what that number should be, however, is a complicated task. Risk managers run cost-benefit analyses, weighing the potential damage from flooding due to a rare hurricane against the expense of building the levee. Lack of historical information and an uncertain future due to climate change make that analysis a moving target at best. "A key question on the engineering side is how to deal with uncertainty that is substantial, deep, and dynamic," says Klaus Keller, Hodgson Distinguished Professor of Engineering.

Having worked as a geoscientist and an engineer, Keller has been grappling for decades with how to better project the impacts of climate change, as well as how to manage the associated risks. For those affected by flooding, he says, cost-benefit analyses can miss important points. "When you talk with people, they don't care just about money," he says. "They also care about whether there is flooding of culturally sensitive places, such as graveyards and churches and how many people may die." Taking those human concerns into account calls for different analyses, where the height of the levee may be less important than other considerations, such as a robust transportation infrastructure or early warning system to evacuate people when a storm hits. "It's not just a bathtub where the water's going to rise this high, so the levee needs to be this high. It's how does the water flow if the levee breaks and what systems fail," Keller says. "Details matter."

Climate change is no longer just a threat, it's here. We are already seeing its effects in severe weather events all over the world, with heavy costs to both the environment and infrastructure. There are many scientists creating complicated climate models to project the impacts of climate change and many engineers devoted to building infrastructure to adapt to it. What's often lacking, says Keller, is the connection between them. "Climate change is a coupled natural-human system; you need to look at how both interact," he says. Rather than spitting out one-size-fits-all approaches—such as the height of a levee—Keller says academics must work more closely with communities to constantly assess and reassess conditions based on how humans adapt to their environment.

"It's like playing a game of chess—you don't plan out for 40 moves, because you don't know what your opponent is playing. You need to make a game plan that will work well under uncertainty but that is also dynamic, because you will learn as you play." To do that, his work brings together engineers, scientists, philosophers, decision-makers, and community members to develop scientifically sound, efficient, and equitable strategies to manage risks driven by flooding, sea-level rise, and other climate threats. "My research focuses on how you improve projections of climate risks and better manage these risks. What are the stakes? What are the odds of something happening? How bad could it be? How vulnerable is the current strategy and how might it fail? How can we better navigate tradeoffs?"

KELLER WAS BORN IN GERMANY IN THE 1960S, WHEN A HOST of environmental issues—dying forests, nuclear waste disposal, a gas crisis—created a new urgency around coming up with responses to those threats. He studied environmental engineering in Berlin in a unique program that included courses in law and economics. Eventually, he came to the United States, where he earned a doctorate in civil and environmental engineering at Princeton before working there as a research scientist and lecturer. In 2001, he became a professor of geosciences at the Pennsylvania State University and in 2015 was named director of its new Center for Climate Risk Management, bringing together scientists, engineers, and other disciplines in so-called "convergent research" to inform strategies to manage climate risks.

While such multidisciplinary, practically focused approaches are becoming more common, they are still rare in academia, Keller says, where tenure, publishing, and grants typically reward specialized expertise. "You want people who know something very well, but you also need an environment where you can exchange ideas across disciplines and engage with decision-makers and stakeholders." The increasing interconnectedness of society, he says, can create cascading effects when disasters occur—for example, when a severe hurricane knocks out a transportation system preventing evacuation or causes a breakdown in healthcare networks to care for those who are injured.

The focus on human-centered engineering drew him to Dartmouth, where he joined the Thayer in early 2022. "The vision to tackle convergent research problems and integrate education is quite unique," he says, pointing out that Thayer doesn't have traditional departments. "Thayer gives people the resources and flexibility to do things they are really passionate about, to tackle big problems, and to collaborate in a rigorous way across disciplines."

To better understand the impacts of climate change, Keller has worked to improve projections of climate-related hazards driven by processes such as melting ice caps, changing storm surges, and increasingly intense precipitation. Many scientists tackle this by creating ever-more-complex models. Keller argues that such an approach can limit the analysis of important uncertainties. "You ask five different experts and get more than five different answers," he says. Running complex models can also take vast amounts of computer power, limiting the number of times such models can be run in a given period to sample these uncertainties. Keller's research group has shown that using simpler models allows for a more careful characterization of uncertainties to inform decisions.

In addition, Keller has focused on the dynamics of coupled natural-human systems. In a recent case study examining the risk of coastal flooding in New York

City, for example, he helped develop a simple model that examined the effects of increased storm surges based on sea-level rise. He considered the effects of hardened infrastructure to mitigate those surges as well as the likely ways in which people might relocate in response. "It's not just that climate change is getting worse, it's also how humans interact with it," he says. "If you build a coastal defense, then how do people move?"

In other cases, Keller's team has pushed for a more nuanced understanding of particular risks in specific locations. He contributed to a recent study examining how high to elevate houses to manage flooding in a Pennsylvania river valley. The Federal Emergency Management Agency (FEMA) presents a simple recommendation that neglects several uncertainties. But Keller and colleagues show that recommendations can be improved by accounting for known uncertainties, such as future flooding, as well as examining more specific attributes for each house, including size, value, location, and initial height of elevation. They concluded that 68 percent of hypothetical homeowners could reduce the likelihood of loss from flooding by considering projections a few feet above FEMA's standard. "There is an avenue to improve and mainstream adaptation decisions. Academics are working on simple-to-use and climate-smart adaptation rules. Perhaps not surprisingly, this can be a hard design problem."

THE WAYS IN WHICH ADAPATATION STRATEGIES ARE APPLIED can also perpetuate inequities in cost-benefit analyses, Keller says. In the case of the river flooding, for example, although house values vary, there are sizable fixed costs to elevate a house. "So, from a pure cost-benefit perspective, it can make more sense to elevate more expensive houses," he says. To the families living in those houses, however, the value of saving their residence is no different. On a more global scale, many cost-benefit analyses place a different value on human life in different countries. "Do you accept that, or do you say that we all have the same intrinsic value?"

To investigate these questions, Keller has taken the unusual step of collaborating with philosophers, contributing to several papers that analyze the value judgments embedded in traditional approaches. "Models used to inform climate-change decisions are not value-free," he says. "It's important to be reflective and transparent about the ethical choices you are making." In one recent study, he helped put those values to the test by bringing academics together with 16 residents of a Pennsylvania town to discuss the homeowners' values around flooding and property damage. This approach suggests a better way to navigate tradeoffs than through a purely economic model. "The academic expert may know the science about the future of ice sheets or the economics of building a pipe or a levee system, but they may not know very well what people care about," he says. "Of course, we need to do the science right, but we also need to do the right science."

Last year, Keller received an opportunity to put those ideas into practice on a larger scale as co-principal investigator for a new project led out of Rutgers called the Megalopolitan Coastal Transformation Hub. It's an effort to bring together scientists, civil engineers, risk managers, social scientists, and community members to consider new strategies for managing climate risks along the New York, New Jersey, and Pennsylvania coastal region. Bringing more perspectives and closer collaboration to the table, Keller believes, can help produce better responses to climate change. "This is one current research frontier: how to design sound strategies in a changing climate under deep uncertainty and with multiple objectives," he says. "Right now, we are leaving money and lives and benefits on the table. Being smarter and better at communication can help prevent that."

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

PREPARE FOR IMPACT

Researchers seek a better understanding of potential climate scenarios.

Many Dartmouth Engineering professors are involved in climate research—such as the projects mentioned here—that aims to inform decision-making.

PROFESSOR MARY ALBERT's National Science Foundation-funded work includes a project to help the Greenland town of Qaanaaq transition from fossil fuels to greener energy. With PhD student Alyssa Pantaleo Th'24 and research associate Hunter Snyder Adv'21, she is modeling the future of energy transitions in Arctic fishing communities by considering the cost of energy from solar, battery electric solar, and hydrogen. "A transition to renewable energy achieved in partnership with the communities could strengthen local energy self-reliance and build technical capacity in ways that embrace their cultural heritage," according to a recent study she published in the December issue of *Science Direct*.

PROFESSOR COLIN MEYER is also focused on Greenland—and what climate change impacts there might herald for other regions. He was named to Dartmouth's Arctic Engineering in a Period of Climate Change academic cluster, along with earth sciences professor Mathieu Morlighem. Their work focuses on the complex societal and environmental impacts of climate change and increased energy production in Arctic regions and beyond. "The cryosphere is fragile and remote, yet it affects every human on the planet through water resources and sea-level rise," he says. "To understand how sea ice, alpine snow, and glaciers will change, as well as how they will affect society, interdisciplinary approaches are required."

PROFESSOR HELENE SERROUSI leads Thayer's Ice and Sea Lab: "Our group is interested in studying the earth ice sheets and their connection to the rest of the earth system to better understand the processes driving their past and current evolution and improve projections of their future contribution to sea level rise." It's an effort she has been pursuing for more than a decade, first as scientist at the NASA Jet Propulsion Laboratory for a decade, and now as a member of the NASA Sea Level Change Team and on the scientific steering committee of an international effort to improve ice sheet modeling and projections.

SuperDARN

Professor Simon Shepherd is leading a team of scientists and students to build the latest addition to the international Super Dual Auroral Radar Network (SuperDARN). Since June 2021, he has traveled to Pykkvibaer, Iceland, more than a dozen times to construct a pair of high-frequency radars to measure the motion of ionized gas in the ionosphere to study geomagnetic storms and other phenomena involving plasma in the near-Earth environment that impact important infrastructure and systems such as satellite communications and energy grids. The new arrays are similar to those he helped build—in 2009 in Kansas, in 2010 in Oregon, and in 2012 in Alaska—as part of a National Science Foundation-funded project with Virginia Tech, the University of Alaska Fairbanks, and the Johns Hopkins Applied Physics Laboratory. Shepherd's team completed most outdoor work in October, and he was setting up the electronics to collect data in late fall.

PHOTOGRAPHS BY SIMON SHEPHERD EXCEPT WHERE NOTED

in ICELAND

Professor Shepherd dons hip waders in late September to dig trenches to lay down coaxial cable to connect each antenna to the electronics "hut." "When we arrived, the site was under 6 inches of water in many places," he says. "When we began digging, the trenches immediately filled with icy water. I spent several days up to my waist holding cables down while my local crew used tractors to push dirt back in the trenches to bury the cables."
PHOTO BY MICHELLE WANG

➤ *Shepherd (in green shirt) and Virginia Tech students and colleagues successfully packed equipment into shipping containers bound for Iceland in June 2021. Shepherd designed the racks to stack and secure the equipment in place. The crew was very surprised—and pleased—when everything fit into two containers.*

◄ *MS student Chloe Baker '20 Th'21 unspools some of the more than 5 miles of coaxial cable along a trench.*
PHOTO BY MICHELLE WANG

▼ *Baker (pictured)—in May with Shepherd and physics major Nat Alden '23—assembles 64 aluminum antenna poles and associated hardware that will form the antenna arrays. "After several more trips to mount and align the poles, measure and lay about 5 miles of coaxial cable, and configure the electronics and calibrate the system, we hope the radars will be operational," says Shepherd.*

➤ *With the help of a local crew during a solo trip in August, Shepherd was able to align and tension poles and begin hanging antenna wires.*

➤ *Hurricane-force winds hamper the efforts of MS students Michelle Wang '21 Th'22 (left) and Baker during build trip No. 8 in late September. Despite the weather, "we did manage to get more than 5 miles of coaxial cable in the ground, covered, measured, and cut to length," says Shepherd.*

"I'd love to see engineering and computer science be at the core of a redefinition of liberal arts."

PHOTOGRAPHS BY ROB STRONG '04

TOP OF HER GAME

Dartmouth Trustee Chair Liz Cahill Lempres '83 Th'84 on opening the door to LEADERSHIP.

BY KAREN ENDICOTT

Since joining Thayer's Board of Advisors in 2012 to her 2018 alumni election to Dartmouth's Board of Trustees, Liz Cahill Lempres '83 Th'84 has applied her leadership acumen in service to the College. Now in the second year of her three-year term as chair of the trustees, Lempres is senior partner emerita at global management consultant firm McKinsey & Company, where she spent 28 years guiding strategy, organization, and performance improvement across industries in more than 20 countries. From Boston, Mass.—where she lives with husband Marty '84 and raised three children—she shared her perspective on leadership, Dartmouth's priorities, and the role engineering should play in the liberal arts.

What drew you to engineering?
No one I knew was an engineer. I was good at math and science in high school but didn't want to be a doctor, so the logical thing was to think about being an engineer. When I got into the coursework in engineering to actually understand what an engineer did, I liked the problem-solving aspect, thinking about different ways to come at a problem to get to the same solution. And problem solving in a team was really exciting.

What were Dartmouth and Thayer like when you were a student?
My class was probably about a third women. My engineering classes had fewer women—maybe 10 or 15 percent—but I never felt any gender issues. We had lecture classes, and then we had small group classes in which everyone participated equally. I've always worked in very male-oriented environments, and that early experience of collaborating on an equal footing with really smart, equally ambitious men became natural to me. That was a good experience from a personal leadership and confidence perspective.

Tell us more about your career path.
I saw engineering as a path to leadership in technology-oriented companies. I began my career at GE in research but found that it was a more solitary role than I wanted. I moved to IBM and started doing marketing to technology or technology-oriented businesses. I've always had an interest in consumer products—what makes people buy certain brands and what makes certain kinds of innovation successful—so I went to business school with the idea of migrating from my more technical roots into something more consumer oriented. After business school, I went into consulting, where problem solving is the core skill that one needs to be successful. That training, along with the liberal arts education I received at Dartmouth—the ability to communicate, write, synthesize, and apply critical thinking—gave me an advantage in consulting. I stayed in consulting for 28 years. I ran McKinsey's Boston office and two billion-dollar practices globally, one in retail and consumer goods and the second in private equity and principal investing.

The background I have from Dartmouth, where you look at problems from different angles and take courses outside your major, makes it easier to move into new areas and feel comfortable that you have a framework for what's most important to understand, what's the most important data, how you solve the problem. Those core elements transcend any industry or particular company.

What is crucial for engineers to know about leadership?
We think about problem-solving from a quantitative perspective, but it also has some softer sides: How do you want to motivate people? How do you understand what an individual's concerns are? How do you think through what a person is feeling and what they mean versus what they're saying? I've found that assuming that people are well intentioned but maybe have a different perspective or a different fact base than you do and approaching it like an engineering problem—"we're trying to solve an issue here," as opposed to "we're trying to dictate a particular path forward"—tends to be more effective, particularly to really intelligent, motivated people.

How have you worked to bring more women into leadership roles?
I have been a champion for women in the areas I have worked in. Within consulting and on corporate boards, the more voices you have at the table, the more robust the conversation is and the better the outcomes. I have always believed that it's important for women to have choices, to make sure they understand the tradeoffs they're making over the long term and feel supported in those choices. It's equally important to have role models to give them confidence they can succeed at higher levels in their organizations. That's been a big part of the work I've done at McKinsey and in other organizations I've been part of.

"The ability to work with professors on university-quality research is a big part of the value proposition for today's students."

—LIZ CAHILL LEMPRES

What about in your role on Thayer's Board of Advisors and now as chair of Dartmouth's Board of Trustees?
I think we've made enormous progress in having more diverse voices at Thayer. When I joined the board, I think I was the only woman. Now nearly a third are women, including Chair Samantha Scollard Truex '92 Th'93 Tu'95. There's also diversity in terms of different applications of engineering capabilities and geographic diversification, which Sam and former Chair Terry McGuire Th'82 have worked on a lot, particularly as we expand our ambitions for Thayer and work to collaborate more closely with computer science. Having a board that brings that breadth of experience is quite important.

At the trustee level, I'm the second consecutive female chair and the third female chair, and the board is now 50-50 on a gender basis. Dartmouth also has several female members of the senior leadership team, including two deans, Alexis Abramson for Thayer and Elizabeth Smith for the Faculty of Arts and Sciences. And Sian Beilock will join Dartmouth as president in July. It may surprise folks, but from a gender perspective, we've made enormous progress.

What about other kinds of diversity?
About a third of our trustees are people of color. That's a big priority

we're continuing to work on, as well as two other forms of diversity: international diversity and diversity outside of Dartmouth undergrads. One of the things that characterizes the board—and it's a real strength—is that, with the exception of one board member, everyone was a Dartmouth undergrad. That brings a shared experience, but it can also be a barrier to taking a university-wide view.

What do you mean by "university-wide"?
That's university with a lowercase "u." We have a significant graduate population across Thayer, Geisel, Tuck, and Guarini. That doesn't mean a diminished focus on the undergraduate experience. One of the things I've learned since being on the board is that the research opportunities afforded by being part of a university are a central component for a significant number of our undergrads. That's a reason they come to Dartmouth. The ability to work with professors on university-quality research is a big part of the value proposition for today's students.

What did the trustees seek in a new president for Dartmouth?
We looked for somebody who came from a strong liberal arts background and understood what a world-class research university looks like. You often get people who are steeped in one and have limited experience in the other, and we've worked hard to make sure that we have a leader who understands the importance of both.

You were on Thayer's Board of Advisors during the envisioning, funding, and building of the Class of 1982 Engineering and Computer Science Center. What does it feel like to see it up and running?
I think it exceeded everyone's expectations. What I love about it is it's going to bring more of the campus to the West End. Everybody who is an engineering major spends time up campus. Now students from various majors are spending time in the West End. When I've been in the new [Arthur L.] Irving Institute for Energy and Society and the new Class of 1982 Center, they're filled with students working by themselves or working in groups. Some are clearly doing engineering project work, but an awful lot of them are not. Simple things such as having cafés make those spaces more welcoming.

I'd love to see engineering and computer science be at the core of a redefinition of liberal arts. I think every student needs to leave Dartmouth with problem-solving skills. We contribute to that by making courses available to non-engineering students. There's so much positive energy and positive buzz around those programs, which like Irving, are cross-disciplinary. I think over time they'll draw many more students to the West End.

How can Dartmouth retain its commitment to teaching and its sense of community while pursuing research and innovation on a national and global scale?
This is a conversation we've had a lot over the last year, when we asked the community for its input on what characteristics we were looking for in the next president. During that process we had candidates meet with just the faculty members of the search committee, because we felt that being dazzled by our faculty was the most effective way to understand and appreciate Dartmouth. To a person, candidates observed to us that they were blown away that these phenomenal researchers and well-recognized scholars talked enthusiastically about working with undergrads. Several candidates challenged us on how we can have great faculty in areas where we don't have graduate students. Our faculty members were so articulate in explaining that Dartmouth undergrads have the kind of research opportunities that in many places graduate students do. What makes Dartmouth different from other universities is that it's not enough to be a great researcher. You have to be good in the classroom as well. When I talk to faculty, the best, the most successful, are those that see undergraduate teaching as contributing to their research because it challenges their thinking.

Why did you get involved in leadership roles at Thayer and Dartmouth?
I went to Dartmouth as a beneficiary of need-blind admission. It changed the trajectory of my ambitions and the kinds of opportunities and the kinds of people I had exposure to. It was always clear to me that anytime Dartmouth needed support in return, it was an obligation I was very happy to repay.

What advice would you give young people who want to pursue leadership roles?
I would say first of all to be resolute in recognizing that there will be setbacks along the way and understanding that feedback is a gift and a learning opportunity. I often find that really talented people are less resilient than it's in their best interest to be. I tell them that they will have bad meetings, they will have bad studies, and they will have performance reviews that won't meet their expectations or will just be bad. That's the way the world works. The people who are successful look at those things as learning opportunities, which is really hard to do in the moment. But over time you build skills and are more able to deal with setbacks. That to me is the most critical thing when you're going into any high-level, demanding career.

At the end of your term as trustee chair in 2024, what would success look like to you?
We will have a successful leadership transition. We will have real progress on our near-term priorities, including around mental health and around diversity, equity, and inclusion, and a plan in place around housing, energy, and sustainability. We will be better positioned to start acting as "one Dartmouth"—with Arts and Sciences, Thayer, Geisel, Tuck, and Guarini working together more fully. And under the next president's leadership, we'll have clarity around what we really want to be known as distinctive for in the next 10 years.

Final thoughts?
It's important for all of us to recognize and celebrate what a jewel Thayer is, how unique it is in the engineering landscape: at an undergraduate level the opportunity to combine liberal arts with engineering, and then at the graduate level the opportunity to work across disciplines and be part of innovative programs such as the PhD in entrepreneurship. I suspect that our kind of broad-based graduate and undergraduate programs will become even more valuable over time because the problems people will be asked to solve in the future are very complicated, whether they are around climate change or geopolitical issues or migration issues, technology- or non-technology-oriented problems. They require an ability to integrate information and look at problems from lots of different points of view, and that's consistent with Dartmouth's approach to engineering and problem solving.

KAREN ENDICOTT is a former director of communications for Thayer and a former editor of *Dartmouth Engineer*.

Alumni News

FROM AROUND THE WORLD

spotlights

Drilling Into Dentistry

The September issue of *Business NH Magazine* profiled the "freakin' cool tech" chief technology officer **Alicia C. Everitt Th'21** and CEO and Dartmouth Engineering **Professor Ryan Halter Th'06** are exploring as partners at RyTek Medical. The Lebanon, N.H.-based company "continues to find new ways to improve biomedical devices," according to the magazine, "having already found success in the areas of traumatic brain injury monitoring, early stroke detection, cancer sensing and imaging, and now dental surgery guidance through the use of bioimpedance-based medical technologies."

At Thayer, recent PhD graduate Everitt specialized in medical device development, with a focus on applications of bioimpedance—or how electrical current passes through the body—in Halter's lab. That research informed development of RyTek's latest device, the OsteoSmartSense drill system, designed to provide real-time feedback to dental surgeons. The drill was among the winning entries last spring at the FreshTracks Capital in Vermont and featured in the Northern New England MedTech Pitch Competition hosted by the Upper Valley MedTech Collaborative. "I am drawn toward this field because of the direct feedback cycle you get to have with the potential impact of your work," she says. "I love working with patients and clinicians. I love getting to bring an engineering mindset to a clinical problem and envision a solution that will directly help people."

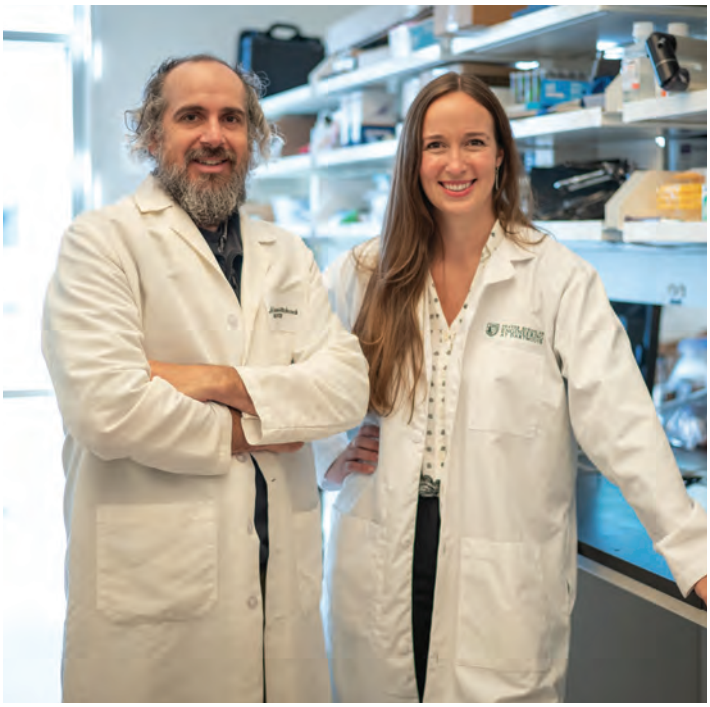
Everitt is currently focused on pursuing FDA regulatory approval on the path to market.

"I'm interested in learning not just about Western philosophy but also about the history of intellectual thought and culture and how that was shaped in China."

—KIMBERLY TAN '22

At the Crossroads

New alumnus **Kimberly Tan '22** has begun a one-year interdisciplinary China studies master's program in Beijing as a Yencheng Academy Scholar at Peking University. "I'm interested in learning not just about Western philosophy but also about the history of intellectual thought and culture and how that was shaped in China," she says. Tan, who is from Singapore, earned a degree in engineering sciences and philosophy major modified with Asian studies at Dartmouth. "I've grown up at the crossroads of East Asia and the West; Singapore has Confucian values and a really big Chinese influence," she says. "But I also lived in Australia for a number of years, and my family moved to the D.C. area when I was in high school, so I've always been fascinated by different cultures and different values."



Professor Ryan Halter Th'06 ▶ and Alicia C. Everitt Th'21

Hot Tech

Chip thermal tester TU3 from Mikros Technologies—a Claremont, N.H.-based firm led by VP **Drew Matter Th'15**—has been named 2022 N.H. Tech Alliance Product of the Year. "In our data-driven world, we increasingly rely on more and more powerful computing systems to power our daily lives," says Matter. "And the chips that empower those systems are made with smaller and smaller transistors packed into tighter and tighter spaces that emit more and more heat as they do their digital work." As every chip is tested at extremes to make sure it will work in its predetermined environment, those hotter and hotter chips were pushing current chip testers to the breaking point—and threatening to cripple a range of industries. Enter the TU3. The new design, which taps into Mikros' microchannel liquid cooling technology, has been deployed on semiconductor giant AMD's production lines. "The TU3 is helping to unlock the global supply chain," says Matter.

Up in the Air

When the U.S. Parachute Association needed a new skydivers instructional manual, **Tim Miller '03 Th'06** jumped at the chance. The Manchester, Conn., resident spent much of 2022 writing and illustrating the guide, which will

On the Job

PETER MAY-OSTENDORP '03 TH'04
DIRECTOR, CONSTRUCTION SOFTWARE ENGINEERING

After 15 years improving energy efficiency in buildings, May-Ostendorp recently switched to the supply side of energy at startup Terabase Energy. From his home base in Durango, Colo.—where he lives with wife Mariah '04 and their three kids—he is helping develop a system to use factory automation techniques, autonomous vehicles, and artificial intelligence to improve the construction of mega- and gigawatt-scale solar plants.

What does your role entail?
I direct the development software systems used to operate field factories that build large-scale photovoltaic plants. It taps into a mix of skills I started developing at Thayer, including mechanical systems, data science, systems modeling, and operations research principles to bear to operate a "factory floor" in harsh, remote environments. We take nothing for granted. In addition to software, I help field a lot of basic infrastructure needs to ensure our teams can establish a digital beachhead in remote, harsh environments.

What skills are essential to your role as director?
My most essential skill is versatility in communication: being able to operate down in the weeds with developers and provide technical guidance on nuts-and-bolts coding issues and then, in the next conversation, translate that work to mechanical engineers or business colleagues. I don't think I will ever perfect this skill, and the only way to learn it is through repeated failure!

What makes your work with Terabase unique?
My team is developing software systems to orchestrate the assembly and installation of truly massive solar plants. Sites can span multiple square miles. The complexity of coordinating operations on that scale in a repeatable and largely automated matter is high to begin with. And consider we have to develop that software while the next generation of our factories are being designed. We operate in a highly uncertain and underdefined environment and need to rely on good design instincts and agile processes to ensure we build the right products.

be available in early 2023 at uspa.org. "I've been jumping since before I started at Dartmouth, but it has mostly been a hobby while I pursued a career in scientific and engineering communications through digital media," he says. "I think for many of us, engaging in this activity—which literally requires us to take our own lives in our hands, to cradle our

own mortality—has a tremendously powerful palliative effect our mental health." A former education associate at the Boston Museum of Science and research associate at Harvard, Miller founded science communications consultancy Spoken Science, now The Miller Lab. Writing the handbook, to replace the previous patchwork of regulations and guidelines, helped him realize how his experience as a skydiving instructor has influenced his approach to education. "The principles of informal science education largely parallel the challenges of teaching adventure recreation: The content is technical, the learners are all adults, and the consequences of failure are very real."

Creating Spaces

As the Thayer representative on the Alumni Council, **Austin Boesch Th'16** says he'll "encourage current students and recent alumni to 'learn how to ask' so they can more effectively leverage the powerful network Thayer and the broad Dartmouth community has created." He is drawing on his experience in Hanover to help young alumni navigate their lives and careers after Dartmouth. "Having attended Thayer later in life than a typical PhD student seemed daunting at first," he says, "but I found a lot of the volunteer, social, and entrepreneurial activities at Dartmouth helped me transition back to academia from industry and created

Rachel Decker-Sadowski '14 Th'15

spaces for me to build lasting relationships." Those connections with students, professors, and alumni enabled him to cofound biotech firm Zepteon Inc. while on campus and then fueled his service on the Dean's Council from 2016 to 2019. "I felt motivated to help enable recent grads' access to resources that can be valuable at the early stages of their career," he says. Boesch continues to serve as CEO of the Boston-based company, has worked with biotech firms Tidal Therapeutics and Sanofi, and is currently "pressure testing some new technology ideas with aims to launch more companies in the biotech space."

"A Smart Look"

A slice-of-life film co-written and produced by **Rachel Decker-Sadowski '14 Th'15** has premiered at the Santa Barbara International Film Festival and was bought by Showtime in October. In Juniper a young woman's plan to grieve alone at a remote cabin is disrupted by the arrival of her childhood friend, played by Decker-Sandowski. "What ensues is a smart look at the grieving process," according to *The Movie Waffler*. It's the latest effort by Decker-Sadowski, who studied mechanical engineering graduate before going on the study theater at the London Academy of Music and Dramatic Arts. She also wrote, produced, and appeared in the 2017 short, *Sister Shit*, and can be seen on NBC's *Brooklyn Nine-Nine*.

3 New Books

Recalling the arc of his 50-year career—from ENGS 21: "Introduction to Engineering" to developing sustainable PET packaging to founding manufacturer Plastic Technologies Inc.—was an enjoyable pandemic publishing project for **Tom Brady '66 Th'68**. He wrote three books, *History of the PET Bottle, Impact of Owens-Illinois on the World*, and *Plastic Technologies Inc.: Our Story*, available at bookbay.com. Among the many anecdotes in the books include working with **Salah Jabarin '66** at Owens-Illinois Inc. to develop the now-famous PET soft drink bottle and how classmates **Dean Spatz '66 Th'67 Th'68** and **Chris Miller '66 Th'67 Th'68** founded Osmonics based on their ES 21 project. He credits Thayer with his entrepreneurial mindset. "ENGSS 21 was probably one of the first courses in the world to formally teach 'entrepreneurship,' " he says. "I estimate that by the time we returned to Dartmouth for our 15th reunion, more than half my Thayer '66 classmates had started their own companies."

Research Recognized

Eric Stolt '20 Th'20 has earned a 2022 National Science Foundation (NSF) Graduate Research Fellowship. The PhD candidate is studying electrical and electronic engineering at Stanford, and the fellowship will provide an annual $46,000 to support his research into piezoelectric power conversion. "Piezoelectric power conversion could enable a new generation of small, lightweight converters for power-dense applications, including electric vehicles, aerospace, and computing," says Stolt. "Fighting climate change will require electrification of nearly everything

Eric Stolt '20 Th'20

we do, and power electronics innovation can be an enabler in this transition. I hope to contribute to this great challenge of our generation." His interest in the field was sparked by the Thayer course, "Power Electronics and Electromechanical Energy Conversion." "Professor Jason Stauth excellently conveyed how power electronics are critical to so many exciting technologies yet are often an afterthought during design," says Stolt. "Fast-forward to starting my PhD at Stanford, where I got involved with this piezoelectric power conversion project, which drew its initial inspiration from a paper by Thayer Professor Charles Sullivan." Stolt traveled to Israel in June to present his work at the Control and Modeling for Power Electronics (COMPEL) conference.


Two New Advisors

On July 1, two alumni joined the Dartmouth Engineering Board of Advisors for three-year terms. **Monica Martin de Bustamante '08 Th'09** is a senior partner at Waltham, Mass.-based Trinity Life Sciences, advising life sciences companies. Previously, she was CEO and managing director of CBPartners, a consulting company she cofounded in 2012 and sold to Trinity. She also serves on the board of Angeli Parvi, a nonprofit providing early-stage seed investments and mentorship to Dartmouth entrepreneurs. **James TenBroek '83** has led the investment of more than $1 billion of equity capital in more than 30 companies, most recently as cofounder of Growth Catalyst Partners in Chicago, Ill. He earned his A.B. in engineering sciences—and the Colligan Prize for materials science—and initially worked as an electrical engineer at Hewlett Packard's medical products group. At the same time, **Chris McConnell '75** and **Mike Ross '71** completed their board terms and were named emeriti members.


In Recognition

The Dartmouth Engineering Board of Advisors has named **E. Kristina "Stina" Brock '01 Th'02** and **Richard Tabors '65** 2022 Sylvanus Thayer Fellows in recognition of their service to and support of Thayer. Tabors is an economist and scientist with 40 years of domestic and international experience in energy planning and pricing, international development, and water and wastewater systems planning. He is president of Boston, Mass.-based energy consulting firm Tabors Caramanis Rudkevich and provides technical assistance on electricity markets to policymakers, utilities, and transmission companies around the world. He also serves on National Research Council committees, most recently evaluating the impact of electric vehicles on the U.S. power grid. Tabors has served on Thayer's MEM Corporate Collaboration Council since 2009 and has been an active career network volunteer, reviewing resumes and sponsoring or hosting a student intern. Brock is the vice president of the board of automotive and energy-storage company Proterra. Previously, the Jackson Hole, Wyo., resident served as senior VP of North America, responsible for all aspects of market development for Electron, a blockchain technologies company in the energy sector. Her contributions to Dartmouth include service on the Women of Dartmouth steering committee, Thayer Mentor Network, Dartmouth Society of Engineers executive committee, Alumni Council, and Thayer Deans Council. She participated in the 2021 Think Thayer's webinar series "The Future of the Grid: Trends, Strategies, and Evolution" and the Investing in our Energy Futures Conference, hosted by the Irving Institute last year.

On the Job

MARA BISHOP WINN TH'01 | ASSOCIATE DIRECTOR WITH HOMELAND SECURITY

"The team of people I work with anticipate what might go wrong."

In her latest role with the U.S. Department of Homeland Security—associate director for planning and coordination at the Cybersecurity and Infrastructure Security Agency—Winn leads efforts to address the country's highest priority critical infrastructure risks from cyber-attacks and other hazards. It's a role that requires her to juggle project management, strategic planning, and stakeholder engagement across industry and government to help reduce risk.

What does your role entail?
On a typical day, the topics I engage on range from the risk of an EMP device's detonation on our national electric grid to encouraging international partners to have the best polices on procurement of 5G communications technology to advocating for the critical infrastructure community to understand and enact more robust supply-chain risk management.

What lessons have you learned?
The most amazing thing about this job is the need for diversity from every perspective. This means I rely on my technical education in physics and engineering to ask the right questions of the subject matter experts, but even more focus on how I can bring together the right people in the right framework to make them successful in achieving the mission.

What continues to engage you in the effort?
There is no shortage of challenges, but I'm surrounded by the most incredible experts, both within the government and in the private sector to tackle these issues. These are issues that, if we do our work right, will anticipate where our resources should be targeted in advance so we minimize the opportunity for catastrophic cascading impacts from serious events. These events could be natural—such as a hurricane taking down the electrical grid in New Orleans—or a threat actor targeting our country. The team of people I work with anticipate what might go wrong and collaborate to keep that from happening.

thayer notes

Gallery

1. Harris McKee '61 Th'63 on the golf course with daughter Laura and her husband, Tom.
2. Nick Mourlas '92 Th'93 is the new head of Johnson & Johnson Innovation.
3. Junfei Yu Th'19 used skills developed at Hanover Country Club to compete recently in the Wuhan Amateur Golf Tournament.
4. Elisabeth Schricker '17 Th'18 married Matthew Hartwig this fall.

| 1950s |

Jack Woods '51 Tu'51 Th'52: During the 70 years since my graduation from Thayer, I spent only one year in an engineering position. However, I found my education at Thayer invaluable: I was taught to think, to analyze, and to prove my conclusions.

| 1960s |

Harris McKee '61 Th'63: My days are absolutely filled with Dartmouth, Admiral at the Lake (the continuing care retirement community in Chicago where I live), and Unitarian Church activities. For Dartmouth I serve as a class co-head agent, digital communications manager, necrologist, and newsletter publisher. At the Admiral I schedule and often lead the audio-visual team for about a program a day, provide PC tech support to residents, lead an occasional book club session, play golf (usually with my daughter) each week during the summer, and spend some time each day with my wife, who resides in the skilled care section of our care center. When I'm asked how I got interested in computers, I relate how my first exposure was in 1960 to a Royal-McBee LGP-30 in Thayer School. We programmed it with a punched paper tape and had to keep track of every single storage location used by the program. Any correction required re-punching the entire tape; fortunately, we could copy before and after any change.

Neil Drobny '62 Th'64: I retired (partially) from Ohio State in 2020 and have settled comfortably in a lake house in Kalamazoo, Michigan. To keep my brain active, I developed a relationship with Western Michigan University to work with students studying various aspects of sustainability. Last year I co-taught a few courses. This year I am leading a new campuswide initiative that provides students with the opportunity to work in groups of three to five to brainstorm sustainable innovations. Groups work together to complete a project that addresses one or more of the United Nations' sustainable development goals.

Ward Hinman '65 Th'68: I'm retired. The only "engineering" I'm doing is minor plumbing repairs around the house and still occasionally working on the addition I built on my house 25 years ago. I used sheets of Hardie board as the exterior sheathing and the bottom edge was deteriorating. They now sell trim strips of Hardie, so I installed that, which turned out to be more difficult than I expected, then caulked and painted. Reading sci-fi, working on my genealogy, and watching my grandson play sports pretty much are the main excitement.

Mark Tuttle '65 Th'66: I recently attended a reception at well-attended Dartmouth Entrepreneurs Forum in San Francisco, Calif. Got to meet new (to me) Thayer Dean Alexis Abramson and Dartmouth Medical School Dean Duane Compton and converse with both and others. A fun event.

| 1970s |

Michael Onderick '73 Th'74: I'm retired after 40-plus years in various segments of the energy industry. My favorite experience was developing one of the first natural gas export pipelines from the United States to Mexico. I'm now living peacefully near my son and grandson in Wichita, Kansas, with occasional overseas jaunts to visit my expat daughter and her family!

| 1980s |

John Dzenitis '86 Adv'88 Th'88: After years leading technical projects, culminating in heading program management at a single-cell biology company (10x Genomics Inc.), I decided to make a sharp career change. I have been making custom furniture full-time for a year as Dzenitis Art and Engineering (dzenitisartandengineering.com). Beth has been a

woodworker since middle school and she introduced me to woodworking in 1990, before we were even dating. I got much more serious about making things in 2015, when we set up dedicated shop space. In 2018, I realized that if I was going to get good at this physically demanding work, I needed to make a career change before I got too old. There were some milestones and succession things to work out at my "normal" job, plus getting through the brunt of the pandemic, before I could actually leave 10x Genomics in late 2021. I like a lot of different materials, but I am somewhat limited in what I use and make by what I can do in a small-ish home shop. Wood is beautiful and warm and can be used in so many diverse ways. I like using domestic hardwoods versus exotics, which don't seem sustainable to me. Metal gives a more modern and cool feel that I like as well. With my shop limitations I mostly end up bending and welding tubing versus casting, forging, or machining. My inspiration comes from a lot of places, sort of combined in a stew and cooked until something comes out: what function the piece needs to have, even if it is just ornamental, a statement or theme that works, fabrication techniques that I either like or have been wanting to try, and some driving shape that could be geometric, nature-inspired, or just curvy.

| 1990s |

Nick Mourlas '92 Th'93: At the beginning of 2022 I took on a new role as head of Johnson & Johnson Innovation, "JLABS," in San Diego, Calif., one of Johnson & Johnson's no-strings-attached biopharm incubators. Launched in 2012, JLABS @ San Diego is our flagship site within our Janssen West Coast Research Center, providing proximity to cutting-edge scientific expertise in discovery sciences, oncology, and neurosciences. I joined JLABS from the West North America regional team of Johnson & Johnson Innovation, where I supported both discovery, product development and supply for Janssen and Johnson & Johnson's medical device businesses.

| 2000s |

Seth Smith '02 Th'03: I am the operational supply chain arm of a business owned by three Dartmouth alums—myself and CEOs **Clara Veinard '01** and **Martinique Grigg '99**—called Coro Foods (corofoods.com). We make some of the best salami in the United States. I've drawn upon my Thayer Machine Shop experience, Engines 21 for attribute force ranking, and thermodynamics with Professor Tillman Gerngross. We are launching into Kroger grocery stores in the Pacific Northwest this fall.

Akash Shah Th'09: I am working with Koch Engineered Solutions in India as lead project manager. I work in fields of combustion engineering to improve the emissions generated by refineries. As project manager I am involved from the designing stage of a project through construction and handover to the client.

| 2010s |

Joey Anthony '12 Th'13: I've been working at a startup called Ultima Genomics with several other Thayer alumni. We just came out of stealth mode and were featured in *The New York Times* in October: "Can Start-Ups Significantly Lower the Cost of Gene Sequencing?" **Jake Wolf '12 Th'13** and I have been working there since 2018, when there were only about 40 employees. We were some of the first mechanical engineers. More recently, we had **Noah White '21 Th'21, Philip Bennet '19 Th'20**, and **Nolan Sankey '21 Th'22** start with internships and join full time!

Ann Baum '12: My sister, Maddy, and I have been building an app called Spillt, and we are now live in the app store. Spillt includes tools for users to save, organize, and share recipes that they find online, paired with better tools for food bloggers to monetize their recipes. Since graduating from Dartmouth I worked as an iOS software engineer at Facebook/Instagram before attending Stanford for my MBA. We're currently live for iOS and Android (in the United States and Canada) and would be delighted to have any members of the Dartmouth Engineering community check it out.

Thomas Balch '12 Th'13: I've been doing autonomous driving research with the Toyota Research Institute (TRI) out of Cambridge, Mass. Recently I've been working on rapid iterative design and testing of the TRIKart platform. In autonomous car research, the natural progression is to test things in software and simulation, then deploy on a full-scale car in a closed course, and finally test it on public roads. However, test time on the closed course is limited and valuable, so you want to make sure you are efficient with it, and simulation can't always capture the intricacies of the real world. The scale car platform is a lower-risk, lower-cost way to quickly iterate testing of a feature before moving it up to the full-scale car. It does a much better job of capturing the nuances of real-world dynamics than most simulators and is better suited for early testing of scenarios with multiple vehicles or one at the edge of control than an expensive, full-scale vehicle. I have put together the software stack running on the scale cars and have also been working on planning and control research around vehicle interactions. Lifewise, I'm living in Maine with my wife, Ashley, and our 4-month-old Freya and loving it!

Kristopher Brown '14 Th'15: After getting a PhD in chemical engineering at Stanford and doing a postdoc in theoretical computer science at the University of Florida, I recently started a job at the Topos Institute in Berkeley, Calif. Topos is an interesting institution as it is a center for cutting-edge research in mathematics and engineering that lies outside of both academia and industry, being a nonprofit with a mission of shaping technology for public good. We are funded by a mix of philanthropy and government research grants. I work on helping scientists and engineers represent their knowledge and models of the world in transparent ways that enable high-level communication and operations performed on these models via a powerful type of mathematics called category theory. This involves a fun mix of theoretical problems as well as practical engineering knowledge, as we release open-source software.

Evan Landau '15: In September I transitioned from freelance industrial design to working at Google as a product research manager for its Pixel phones and other devices. I'm helping to manage design research studies with consumers and working out of one of its N.Y.C. offices.

Scott Mitchell Th'16: I am in my third year of neurosurgery residency at Indiana University. I continue to work on my Dartmouth ENGS 21 project-turned-nongovernmental-organization Stand With Me (standwithme.org) for children with cerebral palsy. Stand With Me builds and distributes free pediatric standing frames in the developing world to help children stand up, perform weight-bearing activities, and develop more normally alongside their peers. We have distributed more than 1,600 standing frames! Also, I recently visited the Dartmouth campus and absolutely love the new engineering building!

Matt Abate '17 Th'17: In August I graduated from Georgia Tech with a PhD in robotics (and two master's degrees). I now co-run a robotic perception startup in Atlanta.

Elisabeth Schricker '17 Th'18: I'm still working as validation systems manager at Pfizer but have moved to North Carolina to be closer to home during the pandemic. I also got married this fall to Matthew Hartwig.

Ashley Sissel '17 Th'18: I'm currently in northern Virginia using my environmental engineering degree to restore degraded streams and wetlands. At Wetland Studies and Solutions Inc. in Gainesville, Va., I use concepts from fluvial geomorphology, natural channel design, and aquatic ecology to recreate functional stormwater management, animal habitat, neighborhood recreation, and prevent the transport of sediment and nutrients downstream.

Gallery

Sisters Maddy and Ann Baum '12 (left) created Spillt.

Amir Sharifzadeh '18 Th'21: I'm a software developer at the Institute of Data Intensive Engineering and Science (IDIES) of the Johns Hopkins University physics department. IDIES hosts a range of scientific databases, such as galaxy surveys and ocean models, and provides consulting to researchers to fill technical skill gaps and recommend or create new tools and approaches for big data and data science needs.

I am currently working on two projects: I am working on quantum materials and implementing computational and software tools with the Platform for the Accelerated Realization, Analysis, and Discovery of Interface Materials (PARADIM) team as well as working as a software developer on part of SciServer, a science platform for astronomy and beyond. In addition to my full-time position, I am taking part-time courses at Johns Hopkins toward my master's in applied physics.

Santi Correa Th'19: I'm living on the Colombian coast! I was promoted to a financial controller role for Smurfit Kappa, one of the world's largest paper-packaging manufacturers. I'm missing Hanover and good old Dartmouth.

Junfei Yu Th'19: I have been a Wuhan (China) Xiaoyaoyao Pharmaceutical Technology entrepreneurship and management trainee since October 2019. There, I have conducted research about potential market opportunities and reported directly to the cofounders to help strategize the company's future. I participated in the inaugural entrepreneurship and management trainee program, rotating among the product, quality assurance, warehouse and logistics, and vendor departments.

After the rotations, I launched an international trading business and a mail-order medicine service business. During the Covid-19 pandemic, as head of the Shanghai team, I led and initiated international trades for the company. In one year the international trade team set deals for more than 200 million face masks in China and more than half a million medical supplies to the United States, United Kingdom, Japan, Italy, and Germany. (I and teammate **Dingyang Lu '17** also arranged for the donation of 50,000 medical masks to DHMC in the spring of 2020.) From 2020 to 2021 I led a team to develop a business of delivering essential medicine, in dosage pill packets with robots handling the packaging process, for more than 400 elderly patients living in the nursing homes in Wuhan area.

2020s

Natalie Garcia '20: I am currently living in N.Y.C. and working at KKR in real estate equity.

obits

Foster J. DeGiacomo '48, a longtime Concord, N.H., resident, died February 16, 2022. After service in the Marine Corps, he earned his engineering sciences degree before concentrating on aerospace studies at Boston University's College of Engineering. He spent the next 25 years with Raytheon in the Boston area, designing and building missiles, before moving to California with North American Aviation to work on the Apollo space program. He returned to the Boston area with Raytheon and then worked with the Army-Air Force Joint Surveillance Target Attack Radar System (STARS) for another 18 years. He was predeceased by his first wife, Nancy, but is survived by his second wife, Christine, and four children.

Andrew S. Beres Jr. '55 Tu'56 Th'56 passed away on May 12, 2022, at his home in Avon, Connecticut. In Hanover he studied engineering and was a member of Gamma Delta Chi and the Forensic Union. After earning his master's in the joint Thayer-Tuck program, he began a 30-year career with IBM as a systems engineer that included years spent living and working in Beijing and Hong Kong. After retirement he circumnavigated the Caribbean on his Sea Voyager for 13 winters. He is survived by his wife of 66 years, Patricia, daughter Nancy, and grandson Rainer. He was predeceased by son Daniel in 2004.

Weston E. Bruner '55 Tu'56 Th'56 passed away in Greenville, S.C., on March 22, 2022. A native of Washington, D.C., he came to Dartmouth from Wilson High School. He was a member of the Dartmouth Christian Union, Delta Upsilon, WDBS, and Air Force ROTC. He earned a joint MS-MBA degree from Thayer School and Tuck School and then served as a captain in the Air Force. He joined Westinghouse Electric Corp. and spent his career as a supervising engineer. He is survived by children Elizabeth and Terrence.

Charles A. Schneider Jr. '57 Tu'58 Th'58 of Charlotte, N.C., died on April 27, 2022, from amyotrophic lateral sclerosis (ALS). At Dartmouth he was a member of Beta Theta Pi, Newman Club, and Army ROTC (drill team), then completed six months of active Army duty. He began a 23-year career at Union Carbide, rising through the sales and marketing ranks with the company. In 1983 he joined Potters Industries, a leading manufacturer of engineered glass materials. As vice president he ran the domestic and international business units until retirement in 1996. He was predeceased by his wife, Jane, and is survived by sons Scott '85 and Kurt '87 and grandson Walker '19.

John B. McCloskey '58 Tu'59 Th'59 of Westfield, N.J., passed away July 18, 2022. He was a brother at Foley House and received MBA and MS degrees in the Tuck-Thayer five-year program. After three years as a lieutenant in the U.S. Army in Indiana, he worked in management for New Jersey Bell Telephone (now Bell Atlantic) until retiring in 1989. Drawing on his experience in finance and at Bell Labs, Dave enjoyed a number of years as an independent consultant and also taught math at a local school. He is survived by his wife, Linda, one daughter, and four sons.

William C. Tindal III '58 Th'59 died in Yallingup, Australia, on March 7, 2022. He grew up in Hartford, Connecticut, was a member of Delta Kappa Epsilon and Sphinx, and rowed crew. After earning his AB in engineering sciences and master's in civil engineering, he worked in construction management in Cairo, Tehran, Jeddah, Singapore, and western Australia, retiring in 1998 as vice president of Asia infrastructure for Fluor Corp. He is survived by his wife, Karen, and children Annalise, Guy, and William.

Daniel A. Paradis '61 Th'62 of Bristol, N.H., died May 7, 2022, after a long illness. In Hanover he was active in the Dartmouth Outing Club and rowed crew. After earning his AB in engineering sciences and BE in electrical engineering, he received a master's in mathematics from the College of William & Mary. He went on to a career in the U.S. Public Health Service in Washington,

D.C., receiving his discharge with the rank of admiral. He then taught at the New Hampton School and Plymouth State University and was active on the Bristol planning and zoning boards. For many years he was responsible for testing the water quality of the Pemigewasset River.

Richard J. Kornblum '66 Th'67 Th'68 of Cotuit, Mass., passed away on February 23, 2022, from complications after a lengthy cardiac surgery. Kornblum earned an A.B. in engineering sciences and then his BE and master's from Thayer with a focus on computer science and industrial automation. He spent his career as an executive engineer, managing the development of international state-of-the-art process control systems at the Foxboro Co., GTE Telenet, and POMS (later Raytheon and Honeywell) and consulted with pharmaceutical and startup technology companies. He is survived by his wife, Margaret, and children Jacqueline, Robert '91, Katherine, and Christopher and their families.

Raymond Glenn Sansouci '73 Th'74 died on February 4, 2022, after a four-and-a-half-year battle with pancreatic cancer. At the College he majored in engineering sciences, played varsity basketball, was a brother of Kappa Sigma, and served as president of Dragon. He went on to earn his BE from Thayer School and an MBA from Harvard Business School. He enjoyed a long career in high-tech factory automation, bringing his skills and leadership to several technology companies, including Westinghouse, Siemens, Schneider Automation, Texas Instruments, Micro E, and GSI. He is survived by his wife of 48 years, Nancy, and daughters Jenny and Lisa.

Mary Collins McDougall '77 of Burlingame, Calif., died on August 31, 2022, of multiple system atrophy. She was a serial entrepreneur and a leader in public companies and early-stage ventures with innovation and software technology at the core. As one of the first females to graduate with an engineering sciences degree from Dartmouth, she was a pioneer in her field and worked to promote opportunities for women in business. In recent years, she mentored other female entrepreneurs as an advisor at Astia, a venture fund that invests in women-owned companies. She is survived by her husband, Don; sons Colin, Ryan, and Michael; and six grandchildren.

Todd Thayer '90 Th'91 of Rochester, N.Y., died August 21, 2022, from lung cancer. In Hanover he was involved with The Dartmouth and Zeta Psi, competed on the wrestling team, and participated in a Spanish language study abroad. He earned his BE in computer engineering and worked at Xerox for many years and most recently with L3Harris. He loved traveling and spending time with family at Loon Lake. He is survived by his wife of 30 years, Ellen; children Kaitlyn, Allison, and Owen; father Norman; and brother John.

Moriah "Mo" Wilson '19—a dedicated member of the women's alpine ski team, a creative engineer, and a sister of Kappa Delta Epsilon—died May 11, 2022, in a homicide. After earning her AB in engineering sciences, she moved to San Francisco, began work as a demand planner at Specialized Bicycles, and started bike racing competitively. Her exceptional athleticism, work ethic, and passion for the sport allowed her to quickly rise through the ranks and establish herself as a leader on the circuit. She is survived by parents Karen and Eric and brother Matt.

Camelia Galos Th'00 passed away from cancer on October 26, 2022, in Rome, Italy, surrounded by husband Paul, son Kyle, and parents. She came to Hanover from Romania in 1997 to seek her PhD under the guidance of Professor Benoit Cushman-Roisin. "The heat of the dot-com boom at the time was irresistible to her, and she decided to downswitch to the MSc in order to graduate earlier to join a hot startup," he says. She worked in the industry for a few years, then earned her MBA from Georgetown in 2007. This was followed by a distinguished career at Pratt & Whitney before she left in 2020 to freelance as a strategy and business development consultant based in Rome.

| in memoriam |

JOHN W. BALLARD '55 TU'55 TH'55

— 1933-2022 —

"We knew a lively and loving leader."

Longtime Thayer Board member John Ballard passed away on April 30, 2022, in Los Altos Hills, Calif. He joined the board in 1989 and served as chair from 1998 to 2007, a time of extraordinary growth and accomplishment. Under Ballard's leadership, the school saw increases of 32 percent in its alumni fund, 124 percent in faculty-funded research, and 107 percent in its endowment. In addition, the school completed the construction of the MacLean Engineering Sciences Center was completed and founded the nonprofit Angeli Parvi to support development and commercialization of Dartmouth research.

"He was a wonderful combination of instinctive entrepreneur, undying and loyal son of Dartmouth, proud member of the U.S. military during the Cold War, Irish storyteller, wonderful husband, father, and grandfather, and the proud chief of the Ballard clan," says longtime board member and former chair Terry McGuire Th'82. "For those at Thayer during John's tenure, we knew a lively and loving leader and partner."

U.S. Navy service as an aviator and officer of an electronic countermeasures squadron in Japan led to a lifelong passion with radio communications equipment. In 1960, Ballard joined Granger Associates, a producer of radio equipment, as a design engineer and moved up to become vice president and general manager. In 1968, he cofounded Technology for Communications International (TCI), which focused on the design and supply of specialized radio systems for clients in more than 130 countries. Thirty years later, Ballard cofounded Radio Propagation Services Inc. to supply real-time information to specialized users worldwide.

His gave tirelessly to Dartmouth, including service on several College and Thayer fundraising committees, as a member of the Thayer Mentor Network, and as a strong supporter of the Dartmouth Society of Engineers and the Magnuson Center for Entrepreneurship. In recognition of his efforts, the College honored him with an Alumni Council Award and Thayer named him a Sylvanus Thayer Fellow in 1988 and bestowed its highest honor, the Robert Fletcher Award in 1998.

Ballard's wife of 63 years, Sue, predeceased him in 2020. He is survived by children John, Ann, Katherine, Mary, Christine, and Cynthia and their families, including grandchildren John Ballard '07 Th'07, Monica Martin de Bustamante '08 Th'09, and Kelsey Kittelsen '17.

THAYER SCHOOL ARCHIVES

Collaborations

Fabrication lessons focus on hand tools.

Lee Schuette, here teaching "Solid Mechanics" students how to build a scale model of a bridge, will share his Machine Shop skills through a new DIAD-funded course.

ROBERT GILL

Sustainable Prototyping

Machine Shop Operations Manager Lee Schuette and Director of Sustainability Rosi Kerr '97 are developing a course titled "Sustainable Methods of Design Prototyping." It's one of five interdisciplinary projects funded by the Design Initiative at Dartmouth (DIAD) for the coming year. The course in Cummings Hall will teach students fabrication skills that integrate hand tool use, material properties, and sustainable practices. "All lessons are focused on food-oriented objects," says Schuette. "We'll be carving chopsticks with a knife from a piece of firewood split with a froe; hand hammering a silver spoon from old silver flatware that was melted, cast, and hand-shaped; and forging a kitchen spatula from an old railroad spike." At the end of the nine-week course at Thayer, students will sit down to a meal using the vessels and utensils they created.

@thayerschool

In a visit to Thayer hosted by Dean @AbramsonAlexis, US @SenatorShaheen and @NSF Director @DrPanch saw some of the cutting-edge work in polar engineering and glaciology from Prof. Mary Albert, executive director of the @US_IceDrilling Program.

@thayerschool

PhD student Arthur Petusseau earned second place in the @InventorsHOF's Collegiate Inventors Competition for his invention, "Hypoxia Imager for Surgery Guidance," which uses a fluorescent imaging agent triggered by low O2 concentration to view hypoxia in tumors.

@thayerschool

Professors Mark Laser and Lee Lynd are co-leading Thayer's third year of online education with @icipe @BioInnovate Africa. Remote-visiting students from East Africa take a two-course sequence during the Winter and Spring terms alongside Dartmouth students.

@thayerschool

MEM students Srishti Chaudhary and Runqing Liu represented Thayer at this year's Society of Women Engineers (@THAYERSWEtalk)

@thayerschool

Student photos from the traditional first-year trip to Moosilauke!

Design Initiative at Dartmouth

Faculty and students discuss the impact of building interdepartmental collaborations to bring more human-centered design tools and mindsets to all corners of campus—from new courses and programs to interdisciplinary research efforts and off-campus projects.

@thayerschool

Undergraduates working in the Dartmouth Biomedical Engineering Center (DBEC) were guided in using Medacta surgical equipment to perform mock total knee arthroplasty surgeries.

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DARTMOUTH COLLEGE

Spotlight on Innovation & Technology

A West End light show welcomed the campus community, alumni, tech visionaries, and entrepreneurs to the inaugural Dartmouth Innovation & Technology Festival in May. The three-day event included panel discussions ranging from artificial intelligence to wearable technology, a Formula Racing showcase, and opportunities to create with faculty and students in a new makerspace.

Photograph by Chris Turner