

2026 FELLOW REPORTS

The reports of the 2025-26 Fellows are presented here. These reports, which were written in March/April 2026, constitute the Fellows' only specific obligation to the Association after being appointed by the Fellowship Board. Each of the recipients expresses appreciation to advisors and teachers, to family and helpful friends, and to the Association, donors, and the Fellowship Board for the honor of being named a Tau Beta Pi Fellow.

Nuha K. Akhtar, ID Γ '25 Anderson Fellow No. 25



My year as a TBP Fellow has been defined by the exciting challenge of pivoting from mechanical engineering to the cutting-edge field of nano-optics. Currently, I'm completing my first-year of Ph.D. studies at the University of California, Berkeley, as the inaugural doctoral student in the newly established Optical Nanoengineering Lab under Dr. Claudio Hail.

A significant portion of my time has been dedicated to the foundational work of setting up our lab for experimental readiness. Parallel to this "ground-up" effort, I've navigated a steep learning curve to master new research regimes involving metamaterials and light-driven systems. To support this interdisciplinary transition, I have been engaging with PhotoBears (Berkeley's joint IEEE-Optica-SPIE chapter) and completing coursework in optics and nanoscience. Additionally, I successfully passed the FE Exam, further rounding out my professional engineering credentials.

A highlight was being awarded the UC Berkeley Chancellor's Fellowship. This prestigious award is part of a competitive program that selects top doctoral candidates based on academic preparation, intellectual potential, and a commitment to diversity. The fellowship recognizes students who have overcome obstacles and intend to serve underrepresented segments of the graduate community.

Looking ahead, I plan to develop outreach programs to make science more approachable. As our lab grows, I look forward to mentoring undergraduate researchers and fostering a culture centered on technical excellence and mutual growth. My ultimate goal is to lead interdisciplinary research in advanced space technologies, translating laboratory discoveries into practical systems. Through my career, I hope to prove that progress in science is strongest when it includes all voices, and I'm grateful to Tau Beta Pi for supporting this pivotal year of my academic journey.

Asa S. Alstead, CA Ψ '25 Nagel Fellow No. 28



In spring 2025, I graduated *summa cum laude* from the University of California San Diego (UCSD) with a B.S. in structural engineering (SE) and a specialization in aerospace structures. During the final year of my undergraduate studies, I began taking graduate-level courses in the fields of structural health monitoring and solid mechanics. This coursework was a part of UCSD's SE B.S./M.S. program, which has enabled me to complete my master's degree with just one additional year of study.

I will be finishing this program in June, and throughout the past year, I've taken advantage of my major's interdisciplinary nature to pursue coursework in a variety of SE-related subjects. In particular, I have focused on finite element analysis, structural dynamics, signal processing, and design & analysis of composite structures. I selected these subjects to best prepare me for my job with the Space and Mission Systems sector of BAE Systems, which I will start this fall.

Following my internship with the company last summer, I looked forward to pursuing a graduate education tailored to my future work in the aerospace industry. This Fellowship has enabled just such a pursuit, and for that, I would like to extend my heartfelt gratitude to the TBP Fellowship Board and to the generous donors who made this opportunity available. I know my graduate studies will prove to be invaluable to my future career, and I am excited to pay this blessing forward.

Karthik Boregowda, FL A '23 King Fellow No. 64



My year as a TBP Fellow was defined by growth and impact. With the support, I advanced my research on PFAS while mentoring STEM students and engaging in community service and leadership through the Florida Alpha Chapter and the National Science and Technology Medals Foundation. I serve as a FL Alpha advisor and joined the advisory board of the Community Weatherization Coalition, contributing to the energy tune-up program, grant writing, and funding applications. I also serve as a scholarship reviewer for the SHPE society. These experiences deepened my commitment and joy in advising, mentoring, and empowering future STEM leaders.

I completed my research on PFAS, chemicals engineered to persist that challenge the resilience of public water systems and the communities they serve. My findings help state/federal agencies and communities navigate operational continuity challenges during PFAS contamination. My manuscript is underway for publication and I'm completing the Preparing Future Faculty Certificate to enhance my holistic, student-centered teaching skills and research experience.

I developed the ZipTree search tool to identify resilient trees by ZIP code. The interactive resource is for engineers, urban planners, agriculturists, environmental professionals, wildfire experts, and restoration practitioners. Accessible at www.zip-tree.com, it covers over 40,000 ZIP codes and 600 tree species. I plan to expand ZipTree to support rural communities, wildfire restoration, land management, and urban planning in wildfire-prone regions.

I conclude by expressing sincere appreciation to the fellowship review committee and TBP HQ staff for their support. I'm also grateful to my mentors, Dr. Euchay Horsman, Prof. Jian Li, Prof. Michael Annable, and Dr. Mike Griffis, for their unconditional support.

Katherine G. Broun, NY K '23 Fife Fellow No. 252



As a TBP Fellow, I completed my third-year as a doctoral candidate in biomedical engineering (BME) at Duke University. I conduct research at Duke's Center for Global Women's Health Technologies under Dr. Nimmi Ramanujam. My research focuses on developing an optical toolkit to image the metabolism of three dimensional organoid breast cancer models. This year, I completed experiments at Duke with murine organoids as well as our collaborator's lab at the Univ. of California San Francisco with patient-derived organoids to visualize metabolic changes in response to chemotherapy treatment. I also delivered an oral presentation at the Biomedical Engineering Society Annual Meeting and am working on a first-author manuscript showcasing our imaging protocol and platform.

Throughout this year, I have continued my passion for mentoring and teaching. I serve as the primary mentor for two undergraduate students, one completing an independent study, and another preparing for a senior thesis. Additionally, I was a teaching assistant for an undergrad signals & systems course with 50 students, leading recitation sections and office hours. For graduate mentorship, I continued to serve on Duke's BME Ph.D. Peer Mentoring Leadership team, hosting events for first years and their mentors. These experiences have shaped how I hope to continue mentoring future scientists throughout my Ph.D. and beyond.

I am so grateful for the opportunities and generous support of Tau Beta Pi during this fellowship period. I will strive to pay this assistance forward throughout my career in cancer technologies.

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Stephen S. Cheng, IL Γ '25 Centennial Fellow No. 40

After graduating *summa cum laude* from Northwestern University with a B.S. in electrical engineering and an M.S. in computer science, I began my Ph.D. in computer science at the University of Maryland, advised by Prof. Dinesh Manocha.

During the fall semester, I explored research topics within robotics and deep learning. While I had done research in robot learning in my undergrad and came into the program with the intent to continue this line of research, I found my true research interests lied in mechanistic interpretability, a subfield of deep learning focused on causally understanding the roles of internal representations and components in large language foundation models (LLMs). My advisor was supportive of this research pivot, and we coordinated a co-advising relationship with Prof. Sarah Wiegrefe.

Following my newfound interest in mechanistic interpretability, I worked on a research project towards proposing a methodology to identify the components in LLMs that are causally responsible for a model alignment technique. I recently submitted this first-author paper to the Association for Computational Linguistics Rolling Review, one of the top conference venues for machine learning. Looking forward, I am excited to continue working on foundation model interpretability, and I will be staying on campus over the summer to do funded research.

I would like to express my deep appreciation for the support provided by Tau Beta Pi, which has provided me with the flexibility to pursue my research interests with fewer funding constraints. I hope to build a career in AI research and represent the TBP community well.



Heather E. DiFazio, RI B '23 Fife Fellow No. 253

In July 2025, I completed my M.Sc. in artificial intelligence in medicine at the University of Bern (Switzerland), defending my thesis titled "Mueller Matrix Polarimetry for Automated Assessment of Dewaxed Pancreatic Tissue Using Deep Learning," and was honored to share this work as an oral presentation at SPIE Optics + Photonics in San Diego, California.

Following my time in Switzerland, I moved to Boston to begin my Ph.D. in the Harvard-MIT Health Sciences and Technology (HST) program in medical engineering and medical physics. As a New England native, it has been especially meaningful to return home and continue my training in such a collaborative environment.

My first year has focused on building a clinical and technical foundation through coursework at both Harvard Medical School and MIT. At HMS, I have taken courses including human pathology, genetics in modern medicine, cardiovascular pathophysiology, and respiratory pathophysiology. At MIT, I have taken deep learning and medical device design, expanding my understanding of how engineering and medicine can inform one another.

Alongside coursework, I completed research rotations centered on medical imaging at MIT and affiliated hospitals, working across modalities including MRI, optical imaging, and X-ray systems. Each experience has reinforced my interest in building translational imaging solutions through an interdisciplinary approach, and I am excited to continue research in this direction.

I am truly grateful for the support of Tau Beta Pi and look forward to remaining an engaged and connected member of this community.



Sarah Cole, CA A '24 Swalin Fellow No. 9

Since receiving this fellowship, I earned my bachelor's degree in materials science & eng'g from Boise State University. Now, I'm a first year Ph.D. student at the Massachusetts Institute of Technology studying nuclear science & eng'g with a focus on nuclear fuels and materials.

Under the mentorship of Dr. Ericmoore Jossou, I am researching chemical interactions between nuclear fuel rods and their encapsulating cladding sleeve during high-temperature, neutron-irradiation service. The main technique I use to image these dynamic interfaces is synchrotron lightsource X-ray computed tomography, allowing me to nondestructively probe the 3D porosity development and fission product behavior in fuel-cladding "wastage" zones. My research supports the qualification of advanced nuclear technology including sodium-cooled fast reactors, supporting deployment in the U.S. commercial nuclear reactor fleet.

Outside of research, I served as Nuclear Engineering Student Delegation vice chair, a week-long nuclear advocacy program in Washington, where I met with Idaho's Senate and Congressional Offices about issues affecting nuclear eng'g students. Second, I served as a student course assistant in an MIT-Clean Air Task Force course for journalists, legislative staff, and energy policy staffers around the world. The course, titled "Nuclear Energy: Key Facts and Issues," spread science literacy to professionals who help advance laws and regulations for nuclear energy deployment.

I'm grateful for the opportunity to join the cohort of TBP Fellows and appreciate the generous financial support. I aspire to become a professor of nuclear engineering to help conduct research that advances clean, reliable energy.



Anna Guidry, LA A '23 Fife Fellow No. 255

I'm currently in the second year of my Ph.D. program at the University of Texas at Austin, where I am advised by Dr. Aaron Baker. This past year, the support of the TBP Fellowship has helped me make progress in my academic and research training. I've successfully passed my qualifying exam, advanced to candidacy, and completed the coursework required for my master's degree.

During this time, I have taken coursework focused on tissue microenvironments, human organoid systems, and tissue eng'g principles. These classes have strengthened my understanding of engineered tissue systems and further developed my skills as a researcher. In the lab, my work centers on understanding how mechanical forces, such as shear, regulate cellular responses in disease. Specifically, my project explores how shear stress influences the function of the blood-brain barrier in the context of diabetes. Over the past year, I have generated preliminary data that will guide the next phase of my dissertation research. I have characterized changes in the glycocalyx, a layer of glycoproteins on endothelial cells, and examined its response to diabetic conditions. I am excited to continue building on these findings and to contribute to a deeper understanding of mechanobiological processes in diabetes.

I am incredibly grateful for the support provided by Tau Beta Pi, which has played a critical role in my graduate studies thus far. In the future, I plan to continue conducting academic research in a post-doc position focused on the mechanobiological effects of disease.



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Jackson E. H. Granat, IL A '25 Fife Fellow No. 258



After graduating *magna cum laude* with highest distinction in the curriculum from the University of Illinois at Urbana-Champaign, I began my Ph.D. in nuclear science and engineering at MIT as a TBP Fellow. I joined Dr. Darin Ernst's research group at the Plasma Science and Fusion Center, where I study plasma turbulence in magnetically confined fusion devices.

During the past year, I've focused on developing and running large-scale gyrokinetic simulations using the GENE and GENE-X codes on high-performance computing systems. My work has included benchmarking ion-temperature-gradient turbulence simulations, generating plasma profile predictions on NERSC's Perlmutter supercomputer, and implementing new diagnostics to study zonal flow dynamics. I am also developing a reduced model that captures important three-dimensional plasma polarization effects within a simpler two-dimensional framework.

This research contributes to improving predictive simulation capabilities for fusion energy systems, a key step toward making fusion a practical, carbon-free energy source.

Looking ahead, I plan to pursue a career in academia, combining research in computational plasma physics with teaching and mentorship. As a Ph.D. student, I hope to continue developing advanced simulation methods for plasma turbulence and to mentor undergraduate students through MIT's research programs. Ultimately, I hope to lead a research group focused on predictive modeling for fusion energy while fostering a collaborative and supportive environment for future scientists.

Abdullah S. Hyder, NJ A '22 Fife Fellow No. 257



Abdullah did not submit a TBP Fellowship report.

Halide Zeynep Haciguzeller, MA H '25 Fife Fellow No. 256



I earned my B.S. in biomedical engineering with a nanotechnology concentration from Boston University, graduating *summa cum laude*. I was a Trustee and Harold C. Case Scholar, and received the Earle and Mildred Bailey Memorial Award, recognizing outstanding scholarship and service. In fall 2025, I began my Ph.D. in the Harvard-MIT Health Sciences and Technology Medical Engineering and Medical Physics (MEMPH) program.

During my fellowship year, MIT's biological eng'g courses have strengthened my foundation in systems biology, biological network analysis, and machine learning for biological applications, while also exposing me to the therapeutic development pipeline, from discovery to clinical translation. HMS clinical courses have deepened my understanding of human biology across scales and the mechanisms underlying pathophysiologies. Understanding the bases of some gaps/problems that exist for patients and in medical practice have equipped me to ask better questions, propose and test solutions/therapies with clinical applicability.

Doing rotations in labs, affiliated hospitals, and research institutes, I've contributed to and expanded skills in different areas like immunoengineering, synthetic biology, immune tolerance, novel cancer therapies for improved immunoactivation, nanotechnology, and biomaterial strategies, which strengthened my interest in modulating therapeutics to be more effective and safer.

In my studies and beyond, combining medical knowledge with technical expertise and lab skills will allow me to create new research findings as I aspire to use pioneering innovations/therapies. I am honored and grateful to be a TBP Fellow and look forward to making meaningful contributions in the future.

Ethan Q. Kessel, IN A '25 Hennis Fellow No. 6



My first year in graduate school has been a whirlwind experience with exciting moments around every corner. After finishing my B.S. in aero-astro engineering at Purdue, I transitioned into a master's in mechanical engineering to continue my research with my supervisor Dr. Eduardo Barocio at the Composites Manufacturing and Simulation Center. This has allowed me to focus on research and expand the scope and goals of my project, incorporating new findings from my efficient reduced-order numerical model as well as a highly novel analytical approximation for optimal layer time in extrusion deposition additive manufacturing. Supplementing this has been an experimental test plan, which so far has shown good agreement between my model predictions and experimental results. Equipment downtime has been a bottleneck, but once my tools are operational again, I expect to be able to complete this project and publish in short order!

These past semesters have also been marked by some of the most interesting learning experiences of my academic career. Between Dr. Byron Pipes' experimental composite characterization class, Dr. Dianyun Zhang's composite design class, and now Dr. Barocio's composite manufacturing phenomena class, I've gained extensive experience in design, analysis, and evaluation of composites, both in the lab and in simulation. This semester, I started flight school, a longtime goal of mine, thanks to the funding of this Fellowship. I've made rapid progress and learned about the practical side of aviation and flight. I'm currently working on my landings and weather permitting, should solo within the next few weeks!

After three years as an IN Alpha Chapter officer, I've directed my focus to transferring knowledge to new members to secure a strong future.

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Kayla M. Ketterling, WY A '25 Sigma Tau Fellow No. 51



During my year as a TBP Fellow, I have focused on completing my M.S. in environmental engineering at the University of Wyoming while advancing my graduate research. Under the guidance of Dr. Jonathan Brant and as part of the Center of Excellence in Produced Water Management, I've worked on developing treatment strategies for produced water in Wyoming.

My research focuses on Osmotically Assisted Reverse Osmosis (OARO) for high-salinity produced water. Through laboratory testing and system analysis, I am evaluating how OARO can improve recovery and desalination performance for challenging brines, with the goal of supporting more sustainable water reuse and reducing reliance on disposal. This work has deepened my interest in membrane processes and strengthened my understanding of the technical and practical challenges associated with water treatment in energy-producing regions.

The fellowship has also allowed me to attend conferences focused on water and wastewater industries, where I have learned from and connected with professionals across the field. These experiences have been especially meaningful in helping me better understand how research translates into real-world applications.

I will graduate this semester and begin my career with HDR Engineering as a water/wastewater Engineer-in-Training, where I plan to continue working on projects across Wyoming. As someone who grew up in this state, I am excited to contribute to improving water infrastructure and addressing challenges related to water treatment and water security in the communities I call home. I'm sincerely grateful to Tau Beta Pi for their support throughout this year.

Parker L. Kotlarz, FL A '22 Tau Beta Pi Fellow No. 849



This past year as a TBP Fellow, I've continued to pursue the intersection of engineering, neuroscience, and medicine, with a focus on developing and translating neuromodulation technologies to improve patient care. My research has centered on epilepsy & psychiatric neurosurgery, where I have worked on optimizing epilepsy surgery planning and developing signal-based biomarkers for obsessive-compulsive disorder, with the goal of making interventions more precise, predictable, and personalized. I also designed a focused ultrasound protocol for epilepsy treatment, using this platform to study network-level and resting-state fMRI changes that accompany noninvasive neuromodulation.

This work has led to four peer-reviewed publications, with additional manuscripts currently under review, spanning topics in neuroimaging, neuromodulation, and clinical neuroscience. I'm grateful that this research has been recognized through acceptance to present at the Organization for Human Brain Mapping annual meeting, which will provide an opportunity to share my work with leaders in the brain mapping community.

In parallel with my research, I have remained committed to the ethical and societal dimensions of medicine & eng'g. I was selected as a FASPE Medical Fellow, through which I will examine the responsibilities of physicians and scientists working at the frontiers of technology and care. I also contributed to MedCURE (Medical Curriculum for Rx Economics), an initiative to equip future physicians with tools to understand why life-saving drugs are often out of reach. This work was recognized with 1st place in the No Patient Left Behind Biotech Fellowship Project Competition.

Tau Beta Pi's support has been instrumental in enabling these opportunities in research, education, and ethics. I am deeply grateful and remain committed to carrying its ideals forward as I continue toward a career as a neurosurgeon-engineer.

Nicole E. Kormos, MI I '25 Spencer Fellow No. 70



I am completing the first year of my Ph.D. in materials science and engineering at the University of Michigan. I have joined the DYNAMED research group, advised by Dr. Alexandra Piotrowski-Daspit. As a whole, our lab is focused on improving nucleic acid delivery with novel polymeric nanoparticles as delivery vehicles. Currently, polyethylene glycol (PEG) is incorporated into nanoparticles to enable them to reach a wider variety of organs, however, PEG has been found to elicit an immune response. My project involves the synthesis and characterization of polymeric nanoparticles with a PEG-alternative polymer to similarly improve the efficiency of intravenous delivery but with increased immunocompatibility. This research is strengthening my expertise in materials while being applicable to healthcare and complementing my B.S.E. in bioengineering.

The first year of my Ph.D. has also included rigorous coursework in materials science to broaden my knowledge in the field. Outside of my program, I have maintained my commitment to mentoring STEM undergraduate students, especially connecting with my undergraduate institution, the University of Michigan-Dearborn. I am tremendously grateful for Tau Beta Pi's support through my first year of graduate school, and I aim to pay it forward by continuing to support the next generation of engineers.

Erin Kreis, NJ A '24 Stark Fellow No. 47



I am grateful and honored to be recognized as a TBP Fellow. This year, I completed my M.S. in biomedical engineering from Stevens Institute of Technology. I also achieved major milestones in my Ph.D. program, including passing my qualifying exams, completing my coursework, and, most recently, writing my dissertation proposal.

As a member of the Musculoskeletal Control and Dynamics Lab at Stevens Institute of Technology, my research focuses on understanding the biomechanics and motor control of older adults as they navigate realistic tasks that challenge balance. The overarching goal of my biomechanics research is to improve fall-prevention training for older adults, empowering them to maintain their independence and quality of life. Additionally, I am conducting interdisciplinary psychosocial research as part of my Ph.D. I led the execution of a four-week intergenerational Art and Movement ageism intervention for a group of 36 older adults from the local community and university students. The intervention significantly reduced hostile and benevolent ageism toward older adults. I plan to translate the findings of my biomechanics and psychology research through my nonprofit for older adults, SilverStrides.

One of the most rewarding experiences of the past year has been mentoring an undergraduate Tau Beta Pi in her research. I look forward to continuing my academic career as a member of the Tau Beta Pi community!

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Douglas K. McDonough, NJ A '25 Stark Fellow No. 48



After graduating from Stevens Institute of Technology with a B.E. in mechanical engineering and graduate certificates in robotics & controls and design & production management, I began my M.S.E. at Johns Hopkins University (JHU) as a Distinguished Master's Fellow. I'm now a graduate research assistant in the IMERSE Lab under Dr. Axel Krieger, and my focus is on developing surgical robotic systems.

Throughout the past year, my research has supported an ARPA-H sponsored project on supervised autonomous robotic renal tumor surgery. To advance this minimally invasive procedure, I designed a modular CAD platform that provides precision instrument stabilization and facilitates advanced surgical functionality, such as stapling. My hardware development efforts also include engineering a foot pedal mechanism to enable autonomous electro-surgery. Additionally, I generated URDF models of surgical grasping instruments to allow for simulated manipulation with the Da Vinci robot. Alongside lab work, I've completed coursework in haptic interface design, computer vision, and flexible robotic system modeling to further hone my technical expertise.

My goal is to pursue a career in surgical robotics research and development after completing my master's degree in 2027. I am eager to push this field forward and broaden the reach of autonomous medical robotics. Fully immersing myself in the research, engineering, and healthcare communities at JHU has been an incredibly valuable experience. I deeply appreciate the generous support of the TBP Fellowship, and look forward to giving back to the organization and supporting future engineers on their own academic journeys.

Kenda Millett, CA E '25 Matthews Fellow No. 28



The TBP Fellowship has been an immense support over the past year. I am currently completing my master's degree in electrical engineering at Stanford University, after earning my B.S. in mechanical engineering with a data science minor from the University of California, Los Angeles.

Tau Beta Pi's support has allowed me to fully engage in advanced coursework, including robot autonomy, robot perception, reinforcement learning, and signal processing, strengthening my interest in intelligent systems and robotics.

My research this year focused on bias-induced sycophancy in large language models, where I studied how model responses shift in the presence of incorrect claims from authorities with different demographic attributes. I found significant asymmetries — particularly stronger effects across race than gender — and observed that sycophancy increases substantially in multi-turn interactions. In parallel, I developed a signal processing project in which I built a machine learning-based perceptual audio coder that achieved strong performance at low bit rates (32 kbps). Combining these interests, I plan to join the CHARM Lab at Stanford to work on machine learning and signal processing in surgical robotics.

I am deeply grateful for Tau Beta Pi's support, which has enabled me to pursue impactful research at the intersection of AI and robotics.

Hannah S. McCollum, AZ A '24 Fife Fellow No. 251



After graduating *summa cum laude* from the University of Arizona in May 2024 with a B.S. in chemical engineering, I took a year off to work in New York City as an editor for the American Institute of Chemical Engineers' magazine, *Chemical Engineering Progress*. I then began my Ph.D. in chemical engineering at Stanford University in fall 2025.

During my first two quarters, I completed research rotations in five different energy and sustainability labs, where I finished mini-projects on electrocatalysts for CO₂ conversion and water treatment, lithium-ion batteries, hydrogels for clean water capture, and nanoparticles for methane pyrolysis. These experiences allowed me to refine my research interests and identify the lab that best aligns with my goals.

I am now working under the advisement of Prof. Tom Jaramillo, where I study the stability of bimetallic electrocatalysts in acidic and alkaline environments for improved fuel cell and water electrolyzer design. In collaboration with Toyota Research Institute, we're developing a comprehensive dataset to enable the application of machine learning and artificial intelligence for accelerated catalyst discovery and decarbonization efforts.

In addition, I've taken coursework in core chemical engineering subjects and areas aligned with my interests, including fluid dynamics, reaction kinetics, thermodynamics, applied mathematics, and energy equity. These courses have strengthened my fundamental knowledge of concepts while deepening my technical understanding of my research.

I am grateful for the support of the TBP Fellowship and plan to continue researching catalysts for sustainable energy technologies, with the goal of pursuing a career in industry or at a startup.

Deepti Naruka, OH A '24 Williams Fellow No. 46



During my time as a TBP Fellow, I completed my second year of medical training at the University of Toledo College of Medicine and Life Sciences. My coursework focused on foundational pre-clinical subjects, including anatomy, physiology, pharmacology, and biochemistry. This past year, I've been actively involved in clinical research, published a manuscript in *Immunobiology*, and will be presenting a trauma surgery quality improvement project at the national Chest Wall Injury Society conference. These projects are a continuation of my summer research internship with the Cleveland Clinic at Akron General, where I conducted large database studies analyzing protocol impacts and internal quality improvement in patient care. While working with these datasets, I integrated my engineering background to develop a coding program for database navigation and statistical analysis. Returning to coding has been especially exciting and has enabled me to contribute meaningfully to these clinical research projects.

I am advising the Ohio Zeta Chapter at UToledo and helped them organize a mentorship panel with the American Medical Women's Association at the medical school. During this event, panelists spoke with undergrad students and answered questions about navigating career decisions. Alongside my mentoring efforts, I have continued to support TBP's mission of "fostering a spirit of liberal culture" by playing violin with the Sylvania Community Orchestra and increasing access to free arts programming in the Toledo community.

I am deeply grateful to TBP for their support this year, which has provided invaluable experiences as I pursue a career in surgery that integrates technical skill with compassionate patient care. I am thankful to remain connected to the TBP community.

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Gabriela Nomura, TX A '25 Tau Beta Pi Fellow No. 850

After earning my B.S. in biomedical engineering from the University of Texas at Austin, I began my journey as a first-year candidate pursuing both a medical doctorate and a master's degree in engineering at Texas A&M School of Engineering Medicine.

Currently, I am part of a research group at MD Anderson Cancer Center, where I'm finalizing a project on cancer ontologies and transitioning into a new initiative leveraging machine learning to detect side effects of radiation therapy in head and neck cancer patients. This research aims to create diagnostic models that help clinicians identify complications early, thus improving patient care and outcomes. The opportunity to work in an environment that integrates health-care, data science, and engineering has fueled my passion for advancing AI-driven solutions to clinical challenges.

Outside research, I serve as co-chair of the Baylor College of Medicine Teen and Young Adult Cancer Prevention Advisory Council, where I lead outreach and education efforts that empower youth to understand and engage in cancer prevention. The TBP Fellowship has provided me with the financial flexibility and encouragement to pursue projects that unite technical innovation with community impact. I am deeply grateful for this support and excited to continue building a career dedicated to applying engineering principles to improve healthcare across the nation and beyond!



Manikandan Pandiyan, MI Γ '27 Hanley Fellow No. 14

As a TBP Fellow, I'm in my 3rd year of the Ph.D. program in mechanical eng'g at the Univ. of Michigan, working in the Combustion Lab under Prof. Margaret Wooldridge's guidance. The fellowship has greatly supported my work as I focus on advancing biomass thermo-chemical conversion through experiments, reactor prototyping, and modeling.

A major focus was experimental and system-level work in hydrothermal carbonization (HTC). I conducted batch HTC experiments on woody and herbaceous biomass across a range of temperatures and residence times to quantify hydrochar yield and energy properties. I also designed and prototyped a novel continuous-flow hydrothermal reactor, addressing challenges in high-pressure slurry transport and system stability. Complementing this work, I developed a new multi-component thermo-kinetic modeling framework for woody biomass decomposition to support reactor design and process optimization.

I've co-authored a study published in the *Journal of Environmental Management* examining sewage sludge pyrolysis, investigating the effects of temperature, residence time, and gas flow on biochar properties and heavy metal stabilization. The study showed that high-temperature pyrolysis produces safe, nutrient-rich biochar, reduces ecological risk by over 90%, and, for the first time, provides a kinetic understanding of heavy-metal removal during pyrolysis.

During this time, I passed my dissertation proposal exam, served as a Graduate Student Instructor for a thermodynamics course, mentored undergraduate students, and served as ASEE co-president of the student chapter at UMich.

After completing my Ph.D., I plan to pursue a faculty career focused on sustainable energy and thermochemical conversion. I'm motivated to develop scalable solutions for waste management, emissions reduction, and energy recovery. I am grateful for Tau Beta Pi's support and look forward to giving back to the eng'g community.



Nora P. O'Kelly, GA A '25 Tau Beta Pi Fellow No. 851

After completing my B.S. in materials science and engineering from the Georgia Institute of Technology, I began a Ph.D. at the Massachusetts Institute of Technology (MIT) in their polymers and soft matter program. This interdisciplinary program combines facets of materials, chemical, and mechanical eng'g in its coursework to prepare us to find novel ways to utilize polymers in engineering applications.

In addition to coursework, I've begun research at MIT advised by Professor T.J. Wallin. Our group focuses on volumetric additive manufacturing, a 3D-printing technique that uses several tiny light beams to solidify liquid polymer in place as it rotates within a vial. The process can selectively trigger chemical reactions anywhere within the material, which can cause it to solidify but can also control other properties. By controlling the degree of light exposure and chemical composition, I'm attempting to create materials with spatially varied refractive index and surface energy. This capability would be critical for applications such as compact optical components, gradient-index lenses, and compliant structures for soft robotic systems. This preliminary work will contribute to my long-term goal of advancing additive manufacturing techniques for soft, multifunctional polymer materials.

Beyond my Ph.D., I plan to pursue a path in academia, continuing with post-doctoral research and ultimately securing a professorship at a research university with a focus on manufacturing polymer materials. I'm deeply grateful to have received TBP's support in my academic journey, and I'm excited to give back by contributing to the greater wealth of scientific knowledge and fostering the development of the next generation of engineers.



Dominic J. Peters, NY H '23 Zimmerman Fellow No. 14

During my Fellowship year at UCLA, I advanced to Ph.D. candidacy and continued my research on the design and control of dynamically operable electrochemical reactors. These systems remain difficult to operate reliably at scale, limiting their deployment beyond laboratory settings. My work has therefore focused on making novel electrified reactors controllable and economically viable as part of the ARPA-E OFFGRID program.

In pursuit of solutions, I led automation and control efforts on an electrolyzer column that produces liquid fuels from waste streams, drawing on concepts from reactive distillation and membrane electrode assemblies. The column operates at 30 bar in hydrogen- and carbon monoxide-rich environments, conditions that lie outside the scope of typical academic testing. To meet these constraints, I designed, built, and commissioned two fully-automated experimental testbeds capable of sustained high-pressure operation. By integrating first-principles models, I developed predictive control schemes to stabilize the highly nonlinear, multi-timescale dynamics of our electrolyzer prototypes.

In parallel, I've designed and validated model predictive control strategies for a protonic membrane reforming system, resulting in publications in the *AIChE Journal and Chemical Engineering Research and Design*, as well as presentations at national/regional conferences. Most importantly, I had the privilege of mentoring undergraduate researchers in control studies, controller stability analysis, and dynamic reactor simulation. This summer, I will join Terraform Industries to implement control systems in a modular fuel synthesis process. My goal is to make electrified chemical processes operable at an industrial scale. I am grateful to TBP not only for its financial support, but for the community and standards it represents. Serving as NY Eta Chapter president reinforced my commitment to disciplined, principled engineering, values that continue to shape both my research and leadership.



2026 Fellow Reports

Mary R. Tran (Peterson), KS B '24 Brandt Fellow No. 4

During this year as a TBP Fellow, I completed my first year as an electrical engineering Ph.D. student at Wichita State University. This included passing the qualifying exams, completing doctoral coursework, and teaching a lecture course for both semesters.

Support from this fellowship has allowed me to focus on research in electric transmission planning and renewable energy. In October, I published research in solar-with-battery systems.

Outside of research, I completed the fundamentals of engineering (FE) exam and received the Engineer-in-Training (EIT) certification, which are important steps towards my goal of becoming a licensed professional engineer (PE).



Vaidehi Pujary, AZ A '25 Forge Fellow No. 13

I completed my undergraduate studies at the University of Arizona last spring, graduating *summa cum laude* with a bachelor's degree in electrical & computer engineering and minors in optics and mathematics. During my Fellowship year, I began my thesis-based master's program at Purdue University, where I am currently completing my first year. My research, under the guidance of Professor Kevin Webb, focuses on speckle optics and super-resolution imaging, including the development of a simulation framework for imaging through atmospheric turbulence. In particular, I am working on a technique to resolve closely spaced satellites in low Earth orbit and extract fine spatial features on them. This work has significantly strengthened my background in computational imaging, optics, and numerical modeling, and has applications in improving high-resolution imaging and object detection in environments affected by atmospheric distortion.

Alongside my research, I've served as a graduate teaching assistant for a circuits lab, supporting 80+ students each semester. I have also completed graduate coursework in Fourier optics and digital cameras, electromagnetic theory, numerical analysis, and digital image processing. Beyond academics, I have remained engaged in service and leadership through the Graduate Society of Women Engineers, participation in the National SWE Conference, and volunteer work with Purdue Science Olympiad.

The TBP Fellowship has been invaluable in supporting my academic and research journey. This recognition has been both meaningful and motivating as I continue my work. Looking forward, I plan to complete my master's thesis and graduate in May 2027. I intend to gain experience in research and development in industry before ultimately pursuing a Ph.D.



August B. Phelps, MD Δ '25 Dodson Fellow No. 12

After graduating *summa cum laude* as a Meyerhoff Scholar from the Univ. of Maryland, Baltimore County with a B.S. in mechanical engineering, I began my Ph.D. in mechanical eng'g at Johns Hopkins University under the guidance of Prof. Jeremy Brown.

In my first year, I have focused on expanding my knowledge in robotics, taking courses in adaptive control, robot device modeling & control, haptics for medical robotics, and human-robot interaction. I also used the first semester to explore projects and review literature in the fields of prosthetics and surgical robotics. I have now chosen a research direction focusing on autonomous electrocauterization for tumor resection. Electrocauterization is a surgical technique that uses heat generated from electrical current to cut through tissue. In traditional surgery, surgeons carefully modulate their cutting speed to achieve precise cuts while minimizing thermal damage to surrounding tissue. My lab's research aims to replicate this expertise in robotic surgery by using real-time thermal imaging to autonomously control cutting speed, thereby optimizing the balance between surgical precision and tissue preservation.

Outside research, I've remained active with the MD Delta Chapter, including serving as an alumni panelist and providing feedback on graduate applications for other members of the chapter.

After completing my Ph.D., I look forward to pursuing a career in academia, combining cutting-edge research in surgical robotics with mentorship for the next generation of engineers. I am deeply grateful for the support provided by the TBP Fellowship, which has provided a strong foundation as I work toward my academic and professional goals.



Magnolia Saalman, MA E '25 Tau Beta Pi Fellow No. 852

After earning my bachelor's degree in bioengineering and biochemistry from Northeastern University, I decided to narrow my focus on the mechanics and design side of engineering and pursued a master's degree in mechanical eng'g. During my year at Northeastern, I worked on my M.S. project with Tatum Robotics,

where I designed a study to gather information from the Deaf-Blind community to make our tactile sign language robot more accessible to a broader population. We reached out to DeafBlind organizations worldwide to better understand what makes accessibility challenging depending on where people live.

Alongside that work, I researched motors and gearboxes to identify the most affordable options appropriate for the robot we were developing. I deepened my understanding of how motors and servos function at a fundamental level and used that knowledge to find the best, cost-effective motor for the Tatum Robotics robot. I also had the opportunity to design a test fixture to evaluate motor durability.

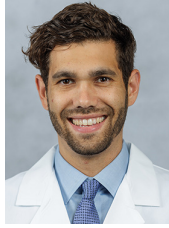
Outside of classes, I served as Northeastern Univ. Triathlon Team president. While leading the team, I trained and competed at the collegiate level, and our team finished 20th overall in the country. In addition, I worked part-time teaching younger students about biology, helping further their education in the sciences.

After graduation, I'm looking to start my career as a mechanical engineer in medical devices, assistive technology, or sports and wellness technology. The support from Tau Beta Pi was invaluable to my graduate education and it gave me the foundation I need to move forward in my career. I am excited to use my skills as an engineer to create devices that genuinely change people's lives.



2026 Fellow Reports

Jonathan B. Silberstein, CA A '15 Tau Beta Pi Fellow No. 853



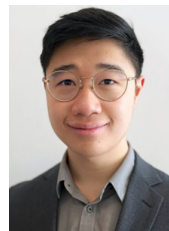
This past year, I've continued my training as a third-year medical student at the University of Illinois Chicago, where I will graduate in May 2027 with an MD and am preparing to apply to urologic surgery residencies. Alongside my clinical clerkships, I have remained actively engaged in translational engineering through the Innovation in Medicine program under the mentorship of Drs. Kotche and Young. Fortunately, my undergrad training at UC Berkeley, in bioengineering and EECS, provided a strong foundation in medical device development.

During medical school, I have focused on integrating clinical insight with technical innovation to address meaningful gaps in patient care. My work has centered on several key projects in urologic and surgical innovation, and I supported a team of undergraduate engineers in developing a ureteroscopic device designed to stabilize kidney stones during lithotripsy and improve fragment capture, culminating in a functional prototype and presentation at a biomedical eng'g symposium. Recently, I've led the development of a single-operator intraoperative ultrasound control system aimed at improving surgical workflow in gynecologic and urologic procedures. Our multidisciplinary team has built a functional prototype and is currently conducting user validation studies, with upcoming presentations at women's health conferences.

Alongside research, I've remained engaged in peer tutoring for preclinical medical students, leading sessions to support foundational learning and exam prep. I have also continued volunteering in a free clinic, working with underserved patient populations and reinforcing the importance of accessible, patient-centered care.

I am deeply grateful for the TBP Fellowship which has enabled me to pursue this interdisciplinary work. I look forward to continuing to integrate engineering with my urologic practice, with the goal of developing technologies that meaningfully improve patient outcomes and quality of life.

Hansen Tjo, MA Z '21 Tau Beta Pi Fellow No. 854



I'm about to complete my 5th year as a Ph.D. student in chemical & biological engineering at Princeton, and I recently published my second research article studying how thermophilic, biomass degrading bacteria uptakes sugars released from plant biomass. Deciphering this process is important for understanding their fundamental biology, which will enable me to better engineer these bacteria for industrial bioprocessing of plant material to renewable fuels and chemicals.

This past year, I also worked to broaden my perspective beyond the laboratory through Princeton's Science, Technology, and Environmental Policy program. Amidst a period of rising technological nationalism, I pursued classes on U.S. foreign policy and the U.S. - China rivalry to better understand how scientific work intersects with diplomacy and global affairs. I'm also honored to have been selected as a Young Scientist for the 75th Nobel Laureate Meeting in Lindau, Germany, which I see as a rare opportunity not only to share my research with an interdisciplinary audience, but also to engage scientists across generations and national backgrounds on the future of scientific collaboration.

I am extremely grateful for the support of the TBP Fellowship, which has provided me with the financial freedom to pursue ambitious research goals. I am also grateful to my advisors who encouraged and supported my fellowship application, and I hope to stay in touch with the Association in giving back to future generations of Tau Bates.

Kyle Woody, CA A '24 Anderson Fellow No. 26



After graduating from UC Berkeley and completing a summer internship at SpaceX, I began my graduate studies in aeronautics and astronautics at the Massachusetts Institute of Technology. My thesis research has focused on the thermal management of additively manufactured rocket engines, with the goal of advancing the performance and reusability of launch vehicles and hypersonic aircraft. In my first two semesters, I also completed rigorous coursework in fluid mechanics, high-temperature materials, and numerical methods, which strengthened the theoretical foundation for my research and broadened my perspective on the design of advanced aerospace systems.

Beyond academics, I had the opportunity to participate in technical outreach around campus. I facilitated a month-long jet engine design competition for MIT undergrads where I helped guide teams through the design process and built the testing infrastructure used to evaluate their prototypes. I also volunteered with members of my cohort at FIRST Robotics competitions in the region, engaging with hundreds of high school students and helping promote interest in STEM among the next generation of scientists and engineers.

I am deeply grateful for the support of the TBP Fellowship during my first year at MIT. It has been an honor to pursue my graduate studies as part of a community that values both excellence in engineering and service to others.