The reports of Tau Beta Pi's 88th Fellowship Program and 2021-22 Fellows are presented here. These reports constitute the only specific obligation to the Association after being appointed by the Fellowship Board. Their reports were written in March, and the verb tenses may sound wrong when read later. 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.

Abraham O. Atte, KS A ’20
Hennis Fellow No. 2

Upon graduation from the University of Kansas in 2020 with a B.S. in aerospace engineering, I transitioned to the Georgia Institute of Technology to pursue a Ph.D. also in aerospace engineering. My current research focuses on examining the aerodynamic interactions between rotors and the effects of these interactions on the performance metrics of individual rotors in multicopter vehicles. My work also involves the evaluation of the behavior of unmanned aerial vehicles in urban flight conditions like high gust flight regimes and urban canyons.

As a TBP Fellow, I have been able to dive deep into my research and make significant progress under the advice of Dr. Juergen Rauleder. Over the last few months, I have designed and implemented experiments in the John Harper wind tunnel at Georgia Tech to quantify the aerodynamic interactions and collected valuable data. Additionally, I have been working on a conference presentation for the Vertical Flight Society national forum. The outcomes from my research present huge economic prospects as they could drive the design of urban air mobility vehicles that will reshape short hault transportation.

In addition to my research, I have been able to focus on coursework, completing the Ph.D. qualifying exams, and getting a master’s degree in May 2022. Outside of my classes, I have been a consistent volunteer with the aerospace outreach program at Georgia Tech through which I connect with elementary school students in the Atlanta area and expose them to aerospace eng’t through a mathematics lens. I have also been involved with the TBP Engineering Futures Program as an online session organizer. I am grateful for the opportunity that this fellowship has afforded me, and I am excited to continue to work towards making advancements in my research and the completion of my Ph.D.

Kimberly R. Bennett, CA AB ’21
Fife Fellow No. 231

After graduating summa cum laude from the University of California, Riverside, with an honors degree in bioengineering, I began my Ph.D. studies at the Harvard-MIT Health Sciences and Technology (HST) Program in medical engineering and physical sciences. While I am currently focusing primarily on the coursework necessary for the program, I plan to conduct translational research focused on targeted drug delivery for neuro-oncological applications beginning this summer.

As a hallmark of the HST program, I have had the opportunity to engage in both coursework at Massachusetts Institute of Technology and at Harvard Medical School. This combination has given me the perspectives I have described by the science and the importance it plays in patients’ lives. Interfacing with patients and hearing their stories has allowed me to tie an even stronger motivation for my research, where I truly feel the call to make a difference.

Outside of class, I have remained dedicated to mentoring other first-generation college students and minorities in STEM. Serving as a CA AB Chapter Advisor, I have been able to advise members on the graduate admission process. Additionally, I have connected with first-generation undergraduate students at Harvard/MIT, providing a space to vent the realities of pursuing higher education at traditionally inaccessible institutions. I also plan to serve as a peer mentor for incoming HST Ph.D. students.

I am extremely grateful for the opportunities afforded to me through the support of both the TBP Fellowship and the Alfred P. Sloan MIT-UCEM Scholarship. It has been an honor to receive these awards, and I look forward to remaining connected to my fellow Tau Bates and paying this support forward in the future!

Casey M. Baker, VA A ’18
Record Fellow No. 29

After graduating from the University of Virginia in 2018 with degrees in biomedical engineering and psychology and working as a research technician at MIT, I began graduate school at Duke University’s biomedical engineering Ph.D. program in 2020.

With support from the NSF Graduate Research Fellowship and the TBP Fellowship, I am coming to the end of my 2nd year of my Ph.D. program. I work in the lab of Yiyang Gong and use novel genetic and optical tools to dissect neural circuits involved in health and disease. Additionally, I use computational modeling to research neural circuits responsible for vision.

Outside of my research, I am involved in the BME mentorship program, which pairs incoming graduate students with older graduate students to help with their transition to graduate school. I am also completing a certificate in college teaching and was a teaching assistant this past fall. While working towards my Ph.D. in biomedical engineering, I am also taking machine learning courses through the ECE department at Duke with plans to earn a master’s in ECE concurrent with my Ph.D. in BME.

I am so grateful for the generous support from Tau Beta Pi and the incredible community of Tau Bates that I have come to know!

Nan (Louise) Chen, NY P ’20
Record Fellow No. 31

I am a second year Ph.D. student in materials science and engineering at Johns Hopkins University. This past year, with support of the TBP Fellowship, I successfully passed my Ph.D. qualification exam and continued research in organic semiconducting materials. My research has branched out to several projects, including work on creating an organic-inorganic hybrid thermoelectric device for energy capture applications. I am also investigating the mechanisms of ionic transport in organic mixed conductors to design an optimal system that yields excellent thermoelectric performance on par with their inorganic counterparts. Recently, I created chemiresistive vapor sensors using four different polymers for detecting the noxious NO2 gas in air. This work was submitted to ACS Materials Letters for review.

In addition to research, I have been involved in leadership activities: serving as the intercampus chair of the JHU Graduate Representatives Organization, planning and organizing several social events such as graduate spring formal, and elected as the international representative at the JHU Material Graduate Society. In this role, I gathered and helped with international students’ concerns about their academic and social life and assisted with international doctoral student recruitment.

Because of my passion for teaching, I applied to be an instructor of the Hopkins Engineering & Research Tutorials for first-year students. This opportunity allows me to design my own course creatively based on my research and to introduce students to different types of cutting-edge eng’g research and its applications to society.

I am incredibly grateful for the support of this fellowship, and am glad to be part of the welcoming and supportive TBP community.
**Joseph M. Cloud, TX H ’19**

**Tau Beta Pi Fellow No. 833**

I am completing the third year of my Ph.D. in computer science and engineering at the University of Texas at Arlington (UTA). I work in the Robotic Vision Lab directed by Dr. William Beksi on motion planning problems for robotic manipulators and on vision sensor systems for field robotics.

Over the past year, I have been working jointly with the UTA Research Institute to tackle learning and safety problems for collaborative robotic manipulators. Our work combines probabilistic movement primitives with control barrier and Lyapunov functions with the goal of enforcing safe robot behavior in the presence of humans and obstacles. These behaviors are learned through human-provided demonstrations. Our results led to three conference papers and one journal publication. One of our papers was selected as a best paper finalist at the IEEE CASE automation conference.

I also led a small team of graduate/undergraduate students in the lab to integrate several vision sensors as part of an unmanned vehicle system. We deployed the robot to a cotton field last semester to capture crop yield data for computer vision experiments. One of my long-term research aims is to address issues in dust-tolerant sensing, which is encountered frequently in the field.

Beyond my research, I have continued to volunteer in STEM outreach events and robotics competitions. Through the lab, I volunteered with several K-12 field trips throughout the year and during Engineers Week. I also volunteered for my fifth year with the FIRST Robotics Competition.

I am grateful for the support provided by Tau Beta Pi in pursuit of my graduate studies and helping me sustain my community involvement. Post graduation, I look forward to continuing to work with robots both as part of my professional goals and volunteer efforts.

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**Kara L. Combs, OH M ’21**

**King Fellow No. 60**

I am now a two-time graduate of Wright State University with my B.S. in industrial and systems engineering (May 2021) and my M.S. in industrial and human factors engineering (December 2021). I have been involved with the Institute of Industrial and Systems Engineers, the Institute for Operations Research and the Management Sciences, TBIT, and the Engineers’ Club of Dayton. I have interned at Applied Research Solutions since May 2020, where I recently accepted a full-time position as of April 2022.

Enrolled in the 4+1 Program, I began working toward my graduate degree during the last two years of my bachelor’s. Specifically, my research explored how to characterize and describe “unknown unknowns,” meaning that the artificial intelligence algorithm had never been previously trained to recognize the subject of interest, whether it be in the textual or visual realms. I compared and contrasted several text-based analogical reasoning algorithms and later, theorized the Image Recognition Through Analogical Reasoning Algorithm (IRTRARAI). I have been able to turn my thesis into a conference paper with two in progress, and I presented my work to the “Barn Gang” at the Engineers’ Club of Dayton.

Receiving the King Fellowship is one of my proudest honors, for which I am extremely grateful. In my best attempt to give back to the Association, I have volunteered my time as a local chapter officer and as a member of the TBIT Student Advisory Board. I appreciate all of the support Tau Beta Pi has given to me, and fully intend to keep giving back!

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**Kelly M. Crumley, MI G ’20**

**Anderson Fellow No. 18**

Following my graduation from the University of Michigan (UM) with a B.S. in biomedical engineering, I began my Ph.D. in BME at UM. I joined Dr. Lonnie Shea’s research lab, where I am studying the use of stem cell-derived beta cells transplanted on microporous polymer scaffolds for restoration of normoglycemia in type-1 diabetes (T1D). This research takes place at the intersection of biomaterials, tissue engineering, and regenerative medicine, for the purpose of creating a novel therapeutic to treat T1D. I am excited by the opportunities to continue to learn and grow within this project and hope to apply the knowledge and skills I develop during my studies to the treatment of additional chronic illnesses.

In the past year, I served first as graduate student vice president and then as graduate student activities chair for my chapter of TBIT. I greatly enjoyed the opportunity to welcome new graduate students to the chapter and to plan and execute events to engage with members of our chapter, college, and community. In particular, I value the opportunities I have been presented with during my time in TBIT to instill curiosity and creative problem solving in young scientists through our community outreach events.

I am thankful for TBIT’s support of my graduate studies and am eager to give back to future generations of engineers as I progress through my career.

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**Emily D. Fabiano, NJ B ’21**

**Record Fellow No. 32**

Upon completing my B.S. in chemical engineering at Rutgers University, I am wrapping up my first year in the Ph.D. biomedical engineering program at Vanderbilt University, under the guidance of Dr. Reinhart-King. During the summer of 2021, I worked on a review paper “Tissue Density in the progression of breast cancer: Bedside to bench and back again,” now available at Current Opinion in Biomedical Engineering. I also have an editorial, in prep, “Insight from a first-generation student: tips for thriving in engineering.” As a first-generation college student, navigating through college was not always easy, so I see this editorial as a form of outreach that can be accessible from anyone, all over the world.

My research at Vanderbilt focuses on understanding the mechanism by which a specific protein, vinculin, regulates breast cancer migration and bioenergetics. I used CRISPR/Cas9 to generate a highly metastatic breast cancer cell line deficient of vinculin. To continue pursuing involvement in outreach, I am a part of Vanderbilt Student Volunteers for Science, in which I go to middle school classes in Nashville to perform various experiments with students. I have also been involved in outreach with underprivileged elementary schools, where we help students explore the STEM field before transitioning to higher education. Further, I remain involved with Rotary International, in which I travel to Nepal to bring school supplies to remote villages, while empowering students to follow their aspirations no matter how far out of reach they might seem.

I am grateful for the support I have received from TBIT as both an undergraduate and graduate student, as it has eased my transition to a new chapter of my life. I will continue my graduate studies as an NSF Graduate Research Fellow, and I hope to expand my outreach efforts and ultimately pursue a career in the pharmaceutical industry.
Anna C. Feldman, NY B ’21
Spencer Fellow No. 66

Anna graduated in the spring of 2021 from Syracuse University with a B.S. in environmental engineering and a minor in environment & society. Now, she is pursuing her master’s of environmental science at the Yale School of the Environment and conducting research on non-point source phosphorus and sediment loading in a New York watershed.

She will use hydrologic models to identify land areas with the greatest potential to generate pollutant loads to surface water. This study operates within the larger goal of maximizing non-point source pollution mitigation efforts to protect drinking water and mitigate harmful algal blooms. Ultimately, she intends to pursue a career in hydrologic science researching aquatic contaminant fluxes and exploring the geomorphologic, hydrologic, and anthropogenic conditions that make aquatic environments susceptible to environmental degradation.

Her time in graduate school has already broadened her perspectives, advanced her knowledge base, and inspired her to be a better advocate for interdisciplinary approaches. She has leaned on experience as a former TBIT chapter president, to take initiative in the New Haven community. She’s become a mentor for high school students through the Peabody Museum of Natural Science’s EVO program. Last fall, she conducted an independent study on a historic groundwater spring to assess its potential to be revived as a drinking water source.

Lastly, she reestablished and now manages a sustainability-focused café on campus. Being a TBIT Fellow has made this possible, and she is tremendously grateful for this honor and opportunity.

Megan C. Flynn, MA B ’21
Hanley Fellow No. 11

After receiving my bachelor’s degree in mechanical engineering from MIT in the spring of 2021, I continued my studies at MIT in pursuit of a master’s degree. I planned to focus my research on the intersection of controls, robotics, and human-machine interactions.

In this first year of my graduate studies, I have been able to complete all the necessary coursework towards my degree. I am grateful for the hands-on opportunities in my marine robotics class, as well as the opportunity to further strengthen my technical abilities in classes such as acoustics & sensing, advanced system controls, and modeling & simulation. The skills and knowledge I have gained have helped me to better understand how to tackle the big research questions ahead of me.

Under the guidance of Professor Doug Hart, I am researching methods of improving cooperative localization and navigation for autonomous underwater vehicles (AUVs). Professor Hart’s lab conducts research in several areas of AUV development, including novel methods of fuel. It has been refreshing to get to know other students in the lab that are working on such varied projects. More recently, I have been able to collaborate across departments with other graduate students working in the computational domain for a project involving a human-AUV team. I plan to use the summer and next semester to conduct experiments and simulations for the completion of my master’s thesis.

Outside of work, I have enjoyed meeting new people and being a part of such a vibrant and curious academic community. I am very thankful for my TBIT Fellowship, as it has given me the flexibility to focus on my research and continue to live a balanced life.

Ian Ho, RI A ’21
Stark Fellow No. 42

I graduated from Brown University with a B.Sc. in mechanical engineering in 2021. Afterwards, I began my first year as a Ph.D. student in Stanford’s biological engineering department. At the end of the first quarter, I joined Professor Manu Prakash’s lab and have been involved in several projects since then.

Along with a postdoc, we are investigating how minimal models can be developed in order to design smart, adaptive materials. Specifically, I have been involved in designing components for constructing what we hope to be a self-learning mechanical network. Ultimately, the goal of this project is to understand how computation can be embedded in biological systems. I have also been assisting in another project in constructing a theoretical model for describing the Stokesian swimming of a parasite, specifically when it interacts with a deformable air-water interface. We hope to uncover how the presence of the interface affects the parasite’s hydrodynamics and develop methods in order to reduce its swimming efficiency as a way to tackle disease transmission.

I am excited to continue exploring the intersection of physics and biological systems.

After completing my Ph.D., I plan to pursue a postdoctoral position in order to continue developing my research experience. I am very grateful for TBIT’s support in my academic pursuits.

Yin Fung Khong, CA K ’17
Tau Beta Pi Fellow No. 832

Upon completion of my undergraduate degree in computer engineering at California State University, Northridge, I have continued my education and pursued a master’s degree in electrical & computer engineering with a focus in Digital Image Processing and Field Programmable Gate Array (FPGA) devices.

I was involved in multiple research projects, including focusing on efficient implementation of nucleus detection and segmentation in microscopic blood sample images that will drastically increase versatility and efficiency of doctor’s diagnosis while reducing the cost. Simultaneously, my other research group worked on a versatile white blood cells classification algorithm using built-in customizable trained convolutional neural network. It achieved a competitive recognition rate in identifying and classifying all five types of leukocytes found in any given blood smear images. Both papers were accepted and published in IEEE Systems, Man, and Cybernetics conference and IEEE Emerging Smart Computing and Informatics conference.

As I continue to be challenged and motivated by the research communities, I am now working on developing a verification framework for System on Chip and FPGA devices that will allow deeper sample depth while providing higher throughput and lower latency than standard verification tools.

Outside of academics, I have been involved with multiple organizations such as TBIT CA Kappa Chapter president, co-founder and president of leaders in engineering and computer science student leader council for the college of engineering & computer science, and co-founded the Engineering Mentorship Program with the ultimate goal of enriching and providing a more robust college experience to students. I am honored and grateful for the generosity and support Tau Beta Pi’s Fellowship has provided for my graduate studies. It has allowed me to continue to grow professionally and personally. I aspire to continue my research efforts while inspiring future generations in the STEM industry.
I am currently a third-year mechanical engineering Ph.D. in the Cardiac Magnetic Resonance Lab at Stanford University and am honored to have been selected as a 2021 TBP Fellow. Since my brother suffered a heart attack at a young age, I have sought out ways to apply my mechanical engineering skills to improving cardiovascular health. My desire to contribute to management of cardiac disease was a key motivation to pursue graduate studies after earning my B.S. in mechanical engineering from Howard University.

Throughout the last year, I have advanced my research which is focused on closing a gap in clinical heart failure management. Currently, no accepted clinical method exists to measure changes to myocardial (heart muscle tissue) stiffness, a significant cardiac remodeling mechanism in heart failure. The overarching goal of my research is to establish a comprehensively validated and clinically viable tool for estimating myocardial stiffness to better understand and manage heart failure.

Over the last year, I have published a conference article demonstrating the utility of my custom-built experimental system for validating myocardial stiffness estimation methods. I am currently using the setup to validate medical image and computational modeling-based methods for estimating heart tissue stiffness. I have also co-authored journal articles with colleagues. Additionally, I have presented my work as talks at the 11th Biennial Functional Imaging and Modeling of the Heart International Conference, and the 7th Annual Summer Biomechanics, Bioengineering, and Biotransport National Conference. Notably, my abstract which was presented at the 30th annual International Society of Magnetic Resonance in Medicine Conference was awarded a Magna Cum Laude award. Over the next few years of my Ph.D. journey, I look forward to continuing my research which is at the intersection of medicine and engineering with the goal of making substantial contributions to healthcare.

After finishing my undergraduate education at Cornell University with a double major in computer science and operations research, I started to pursue my Ph.D. at MIT Operations Research Center in fall 2020. Under supervision of professors Retsef Levi and Karen Zheng, I have been working on incentive optimization and contract design with applications in agriculture and food quality.

In particular, during my first two years of studies, my research efforts have been focused on two projects along the line of contract design. One of my projects is about choosing and incentivizing a set of influencers in a rural network to promote technology adoptions; the other project is about contract farming and maximizing quality-improving effort levels.

Outside of my research and coursework, I’m involved in my department as one of the REFS (resources for easing frictions and stress), a group of students providing confidential peer-to-peer support to issues such as time management, communication with advisor and other students, personal matters, and so on. I’m also the co-chair of gwaMIT (graduate women at MIT) to provide more resources and support for female graduate students through organizing empowerment week, leadership conference, and various workshops and panels.

I plan to pursue a job in academia after completing my graduate study. I really appreciate the support from Tau Beta Pi and I look forward to paying it forward throughout my future career.

After graduating with a bachelor’s degree in civil engineering from West Virginia University, I spent the summer working in Pittsburgh, PA, at the Bettis Atomic Power Laboratory, a branch of the Naval Nuclear Laboratory. My work focused on environmental monitoring and remediation which provided useful preparation for my graduate education. I then entered the master’s degree program in environmental engineering at the University of California, Berkeley, where I developed an interest in air quality. Specifically, I worked on projects related to the decarbonization of freight transportation. I submitted an NSF grant related to how contaminants in the freight sector, like carbon dioxide and fine particulate matter, could be remediated through truck electrification to achieve the 90 percent reduction in greenhouse gas emissions needed to reach carbon neutrality by 2050.

After earning my master’s degree, I will travel to New Zealand on a Fulbright Scholarship. As a graduate student at the University of Canterbury in Christchurch, I will study research methodologies for investigating hydrological processes and soil erosion. The TBP Fellowship provided the funding needed to support the travel expenses associated with relocating from West Virginia to California and New Zealand. I am grateful to the organization and alumni who helped me to launch my career in environmental engineering.
Veronica Montgomery, MA B ’16
Williams Fellow No. 42

I am in the final year of my Ph.D. program in biomedical engineering at Georgia Institute of Technology, where I am working in the lab of Dr. Mark Prausnitz. For my research, I have been working to engineer bacteria that normally live on human skin to produce therapeutics as a form of long-term drug delivery to the skin.

I am currently working on finishing experiments with the goal of defending my dissertation this summer, and I have begun exploring career options for my next steps. While I have encountered many challenges pursuing this research, I am inspired by the idea of harnessing bacteria to treat or prevent diseases. After graduating from my Ph.D. program, my goal is to work in the biotechnology industry, where I hope to continue to leverage synthetic biology for human health applications.

Outside of research, this year I was able to continue pursuing my interest in science outreach activities in a virtual format. I worked with another graduate student to design a workshop on “Cells as Medicine” for the outreach organization BioIgnite, and I volunteered as an instructor to teach the workshop to middle school students in virtual sessions. I was also awarded an AAUW American Dissertation Fellowship.

I am extremely thankful for the generosity and support from Tau Beta Pi. It was an honor to receive this fellowship.

Elisa B. Nieves, FL A ’20
Record Fellow No. 30

With support from Tau Beta Pi and the National Science Foundation GRFP, I completed the second year of my Ph.D. in biomedical engineering under the advisement of Dr. Andrés J. García. The direction of my current research project aims to better understand the relationship between biochemical and mechanical cues during the wound healing process with the ultimate goal of identifying pathways to mitigate chronic wounds and fibrotic scar tissue.

Over the past year, I have had the opportunity to work on various projects investigating the interactions between cells and biomaterials. This has taught me several new laboratory techniques including 3D traction-force microscopy and microfluidic stem cell potency assays. My research contributions over the past year have amounted to a manuscript submission as a second author to Biomaterials which is currently under review. In late August of 2021, I passed my qualifying exam and by the end of spring 2022, I will complete all course and teaching requirements for my program.

Outside of my academic achievements, I have had the opportunity to mentor a first year Ph.D. in my program. As a teaching assistant for Intro to BME design, I also served as a mentor and advisor for 50 students (12 projects) over the year. I also volunteered for the Atlanta Science Festival where the Georgia Institute of Technology hosted hundreds of K-12 students.

I am thankful for the support of Tau Beta Pi which has allowed me to reach all these milestones over the past year.

Ashle M. Page, NC A ’17
Tau Beta Pi Fellow No. 831

Ashle deferred graduate admission and did not accept the funding for her TBP Fellowship. She has informed the Director of Fellowships of her decision and will not be submitting a report.

Parker S. Ruth, WA A ’21
Tau Beta Pi Fellow No. 834

Parker graduated summa cum laude from the University of Washington with bachelor’s degrees in computer engineering and bioengineering. He was honored to be recognized with a Dean’s Medal, the College of Engineering’s highest award and is now starting his Ph.D. in the Stanford computer science program.

In his first year, Parker is conducting rotations in three research labs to diversify his skills and establish new research connections. His first rotation was with Dr. Scott Delp, who has faculty appointments in bioengineering and mechanical engineering. The rotation project was focused on estimating metabolic rate from video, building on prior work from Dr. Delp’s lab on extracting kinematics from video-based pose estimation and estimating metabolic rate from inertial wearable signals. He is currently conducting a second rotation with Dr. Michael Snyder, the chair of the Stanford Genetics department. In Dr. Snyder’s lab, he is researching applications of wearable sensing technology to better understand and manage long-term sequelae of COVID-19 infection. In spring, he plans to rotate with Dr. James Landay in the field of human computer interaction.

Parker’s graduate studies so far have been very gratifying. He is deeply grateful to the wonderful mentors who have helped him reach this point and is eager to pay forward their generosity to the next generation of scientists. He hopes to pursue a career as tenure-track faculty, developing computational tools to improve the quality and accessibility of healthcare.
Ayushi K. Sangoi, NJ Γ ’20
GEICO Fellow No. 6

I am completing the second year of my Ph.D. in biomedical engineering at New Jersey Institute of Technology and Rutgers University at the Vision and Neural Engineering Laboratory. My research focuses on determining the neural mechanisms behind oculomotor tasks in those with persistent post-concussive symptoms and controls utilizing functional magnetic resonance imaging (fMRI). This past year, I designed the visual stimuli for the fMRI experiment and manipulated it to have consistent results in all of the sites for an NIH R01 grant under the guidance of Dr. Tara Alvarez. This R01 will allow me to gather the data for my dissertation, which will be essential to developing better methods of identifying vision problems and understanding “hidden disabilities” that may linger after concussions in some patients. I presented my preliminary comparison between the groups at the 2022 Northeast Bioengineering Conference (NEBEC).

In April, I was awarded the NSF Graduate Research Fellowship, allowing me to further my ambitions in research. I have mentored an undergraduate biomedical engineering student and guided her with a research project that she presented at NEBEC. Additionally, I was able to run a series of workshops to teach middle and high school girls how to code as a campus facilitator in Kode With Klossy. I have also served as a TA for three courses in biocomputing and bioelectronics. Academically, I have completed a certificate program in data analytics while exploring my interests in computation and experimental design.

I have thoroughly enjoyed being the NJ Gamma Chapter president at NJIT, where we have increased member engagement and participation. I am incredibly grateful to TBPI for honoring me with a Fellowship and supporting my Ph.D. I look forward to continuing to give back to the engineering community in the future as a researcher, educator, innovator, mentor, and outreach coordinator.

Shikha Srinivas, CA Γ ’21
Forge Fellow No. 9

After graduating with my bachelor’s in environmental systems engineering, I began my master’s degree at Stanford University in sustainable design and construction on the sustainable urban systems track. Given the influence of infrastructure and community spaces on public health, I was even more motivated to explore the ways large infrastructure projects are built, delivered, and evaluated long-term. I took courses on construction project management, life cycle assessment, project delivery, integrated infrastructure, and energy equity. Whether we were evaluating ecosystem services of urban farming or submitting a proposal for a tunnel crossing in the Bay Area, I most valued collaborating with peers, and many exposed me to new interests and pathways in the architecture, engineering, and construction space.

One highlight of this year was serving as a teaching assistant for the Shaping the Future of the Bay Area series, part of the Stanford Future Bay Initiative. Over multiple quarters, I worked with over fifty students programming in R to transform data into insights about urban challenges, such as housing burden and flood hazard. Helping students improve their skills and considering the ethical challenges related to urban infrastructure decisions was critical to evaluating my own long-term goals within and outside of my career. I also continued my work with our civil and environmental engineering undergraduate equity group focused on promoting a more equity-driven engineering education.

After graduation, I will be working as a graduate energy and sustainability consultant with Arup in San Francisco. This role will help me dive deeply into technical interventions to decarbonize the built environment and learn from passionate leaders in the field. I am so grateful to Tau Beta Pi for supporting such a rich graduate experience that has given me lifelong memories and experiences in pursuit of my goals.

Charles Van De Mark, CO B ’19
Swalin Fellow No. 5

Charles has not submitted his report.

Ronald (RJ) Vogler, KY A ’21
Dodson Fellow No. 8

After receiving a bachelor’s degree in chemical engineering from the University of Kentucky, I moved to the University of Texas at Austin to pursue a Ph.D., also in chemical engineering. As a first year Ph.D. student, I worked on coursework and research. In October 2021, I joined the research groups of Dr. Manish Kumar and Dr. Benny Freeman, both of which have a focus on membrane separations. My primary project involves the purification of aquaporin channels and the integration of these proteins into membranes; the main objective is to create membranes that leverage the fast water transport and the salt retention of aquaporins for water desalination. During this time, I have also gained experience with some material-characterization techniques, such as scanning electron microscopy and transmission electron microscopy. Outside of my main project, I am starting to work on another project about the concentration of lipid particles, which can be used to transport RNA for therapeutic applications.

During the spring semester, I began mentoring an undergraduate ChemE student, mainly focusing on membrane performance testing and theory associated with membrane separations. Additionally, I have continued to pursue some of my research interests that I developed as an undergraduate. Specifically, I have joined a collaboration with a faculty member and a current classmate on a project related to engineering education and completed a transport-modeling analysis for a recently published project on the use of temperature-responsive membranes for the removal of fluorinated organics from water. Lastly, I got involved with graduate student recruiting activities by sharing my experiences at the University of Texas with prospective students.

After graduate school, my goal is to continue working on scientific research in a government or industry lab.
Joseph Wakim, MA Θ ’19
Zimmerman Fellow No. 10

During my time as a TBI Fellow, I earned my master’s degree in chemical engineering from Stanford while progressing towards a Ph.D. My graduate coursework sparked an interest in biomedical informatics, which motivated me to pursue a Ph.D. minor in the field. I will apply my multidisciplinary training to address biomedical problems using fundamental physics, an approach which I have begun to adopt in my research.

Through my research into physical chromatin modeling with the Spakowitz lab, we discovered patterns affecting the heritability of epigenetic marks, which we published this past autumn. More recently, we developed a physics-based chromatin simulator leveraging patterns of multiple epigenetic marks. We are applying this simulator to investigate how epigenetic cross-talk affects DNA organization and associated gene expression.

Outside of the lab, my experience as a teaching assistant solidified my aspirations of one day serving as a teaching professor. I am thankful to have been given the opportunity to help develop and teach a new application-focused machine learning course with Dr. Spakowitz. The course was well-received, and I was kindly recognized with an Outstanding Teaching Assistant Award for my efforts. I am excited to be teaching the course again this spring.

I am so grateful for the generous support provided by Tau Beta Pi, which allowed me to focus on coursework, research, and teaching during my fellowship year. By teaching aspiring engineers and supporting research in biomedicine, I will strive to pay forward the educational opportunities afforded to me. I will uphold the values of scholarship, leadership, and integrity embodied by Tau Beta Pi for this award and for connecting me with an incredible network of talented engineers. They have been critical to my success and continue to inspire and motivate me to achieve my goals.

I am thankful to have been given the opportunity to do rotations to explore my interest more in depth before committing to a research lab. My first rotation was with Professor Linda Griffith working on elucidating the immune profile in endometriosis and examining key players in such an inflammatory environment. My second rotation was with Professor Michael Birnbaum where I utilized trained machine learning models to identify and characterize signature peptide presentation on the MHC of antigen presenting cells in rheumatoid arthritis. I am currently rotating in Professor Feng Zhang’s lab at the Broad Institute working on CRISPR-associated transposition with the goal of inserting long strands of DNA into mammalian cells.

I also plan to partake in MIT’s graduate teaching development tracks certificate program to improve my teaching skills and the graduate certificate in technical leadership to improve my professional competencies. I hope these programs prepare me for my future career in academia or in the industry.

Dell H. Zimmerman, TN Z ’21
Centennial Fellow No. 36

After graduating from Boise State University with a B.S. in materials science and engineering, I began my Ph.D. at UC Berkeley in Professor Lane Martin’s lab. My research utilizes high-throughput computational workflows alongside the Materials Project, an extensive database of theoretically and experimentally generated inorganic compounds, to predict and synthesize new functional electronic materials. The goal of this work is to streamline the development of new materials with emergent phenomena and provide a powerful feedback loop between experimentalists and theorists.

This year, I have focused on coursework and getting familiarized with the lab. The primary tool we use for synthesis is pulsed laser deposition (PLD), which uses a high energy laser to ablate a target material and deposit it onto a substrate as a thin film. I learned to synthesize highly crystalline oxide thin films which I subsequently studied with x-ray diffraction and scanning probe microscopy. I also used PLD to grow layered heterostructures which I processed, via photolithography and wet etching, into microcapacitors to measure dielectric and ferroelectric properties. Recently, I was able to synthesize an entirely new material predicted by the Materials Project, and am working to characterize its crystal structure and properties.

In March, I was awarded an NSF graduate research fellowship, which will enable me to further expand my research ambitions and provide a strong foundation for a future career in academia. I hope to continue pursuing research and developing my understanding of the physical mechanisms that govern our world, while providing pathways for future generations to do the same. I am grateful to Tau Beta Pi for this award and for connecting me with an incredible network of talented engineers. They have been critical to my success and continue to inspire and motivate me to achieve my goals.

Yiming (Jason) Zhang, AL Γ ’21
Fife Fellow No. 232

After graduating from the University of Alabama at Birmingham (UAB) with a bachelor’s of science degree in biomedical engineering, I started my Ph.D. program in biophysical engineering at the Massachusetts Institute of Technology (MIT) with the generous support from Tau Beta Pi.

My research interests lie at the intersection between studying immunology and synthetic biology. Thanks to this fellowship, I am able to do rotations to explore my interest more in depth before committing to a research lab. My first rotation was with Professor Linda Griffith working on elucidating the immune profile in endometriosis and examining key players in such an inflammatory environment. My second rotation was with Professor Michael Birnbaum where I utilized trained machine learning models to identify and characterize signature peptide presentation on the MHC of antigen presenting cells in rheumatoid arthritis. I am currently rotating in Professor Feng Zhang’s lab at the Broad Institute working on CRISPR-associated transposition with the goal of inserting long strands of DNA into mammalian cells.

I also plan to partake in MIT’s graduate teaching development tracks certificate program to improve my teaching skills and the graduate certificate in technical leadership to improve my professional competencies. I hope these programs prepare me for my future career in academia or in the industry.

Amanda O. Christensen, WY A ’21
Sigma Tau Fellow No. 47

Amanda deferred her Fellowship and her report will be included with next year’s Fellows.