The reports of Tau Beta Pi’s 85th Fellowship Program and the 2018-19 Fellows are presented here. The reports constitute the only specific obligation to the Association after being appointed by the Fellowship Board. Their reports were written in April, and the verb tenses may sound wrong when read later.

Each of the 30 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.

2019 Fellow Reports

Monical N. Agrawal, CA Γ ’17
Forge Fellow No. 7

After graduating from Stanford University with my M.S. in computer science, I spent four months as a research intern at Flatiron Health. At Flatiron, I developed a machine learning framework for extracting drug treatment intervals from longitudinal clinical notes; this work was presented at the Machine Learning for Health workshop at the 2018 NeurIPS conference.

In September, I began my Ph.D. in computer science at the Massachusetts Institute of Technology. I soon joined the Clinical Machine Learning Group led by Dr. David Sontag, which works to develop robust computational methods to impact healthcare. My research focuses on the automatic extraction of structured data from clinical notes to enable downstream clinical applications and outcomes research.

Apart from research, I’ve been kept busy by computer science courses that have helped solidify my theoretical foundations. Additionally, I have begun coursework through the graduate education in Medical Sciences certificate program that MIT offers jointly with Harvard. Through the program, I gain healthcare context to help translate my research into clinical practice, via classes at Harvard Medical School and a clinical preceptorship.

Outside of research and classes, I have become an officer for GW6, a group for the personal and professional development of graduate women in the MIT EECS department. I am incredibly grateful and honored for the generous support from Tau Beta that allowed me to smoothly transition into my doctoral studies.

Mohammad A. Alkhadra, CA Ψ ’17
Fife Fellow No. 216

After graduating from UC San Diego with B.S and MS degrees in chemical engineering, I moved to Cambridge, MA, to begin my Ph.D. at MIT in the same major. While at UCSD, my research focused on developing new and convenient approaches for measuring the glass transition and fracture behavior of semiconducting polymers. At MIT, however, I decided to shift my attention to the remediation of contaminated water using what we call “shock electrodialysis (SED),” a novel electrochemical technique discovered and developed by our group.

As early projects, I chose to work on treatment of nuclear wastewater in collaboration with Mitsubishi Heavy Industries as well as on selective removal of toxic heavy metals such as lead and copper. These two projects have given me the opportunity to learn important experimental techniques and the fundamental physics that govern SED. After completing these projects, I plan on using SED to explore dielectrophoretic separations, which are based on the ability to exert electric forces on a dielectric (polarizable) particle by imposing nonuniform fields. The target contaminants in these studies will include macromolecules (e.g., polymers, nucleic acids, and viruses), nanoparticles, and nanoemulsions. My ultimate goal is to establish a deep understanding and extensive body of work that will allow our team to commercialize this technology in hope of it impacting communities that need clean water.

Outside of research, I lift weights, play squash, read/listen to nonfiction books, and play the piano. I plan on finding future opportunities in outreach and broader impact to pay forward all the great services that have helped me become who I am today. Thank you Tau Beta Pi for your commitment to the personal and professional integrity of engineers in America.

Naveen Arunachalam, CA B ’18
Dodson Fellow No. 5

Following graduation from Caltech with a bachelor’s degree in chemical engineering, I began my Ph.D. program in chemical engineering at MIT. Prior to MIT, I did a summer rotation in the lab of Professor James Swan, where I studied the behavior of monoclonal antibodies attached to star polymers. During the rotation, I worked on studying the dynamics and design space of these materials from a computational perspective. I took a full course load of core chemical engineering courses, which taught me essential analytical skills for a broad range of subdisciplines.

This training helped me prepare for the end of term, when I joined Heather Kulik’s group. Since then, I have been working towards streamlining the discovery of new inorganic materials using computational techniques such as first-principles electronic structure calculations and machine learning.

In addition, I have also focused heavily on community outreach and personal growth. Since joining MIT, I have tutored students at King Elementary in Cambridge through the ChemE Math Team, participated in several subcommittees of the MIT graduate student council, and volunteered in science outreach events at the Cambridge Science Festival.

On the side of personal growth, I have taken opportunities to participate in new and interesting activities such as table tennis, which have helped me maintain a balanced life. It has been a great honor to serve as a TBH Fellow, and the financial support has allowed me to focus on the things that matter to me the most, such as community engagement, personal growth, and professional development. I would like to continue exploring the wealth of opportunities available at MIT and performing research to push the boundaries of what is currently known.

Garrett F. Beeghly, VA A ’17
Fife Fellow No. 218

After completing a Whitaker Research Fellowship at the University of Cambridge, I began my Ph.D. in biomedical engineering at Cornell University as a Presidential Life Science Fellow. There, I joined the lab of Dr. Claudia Fischbach where I began investigating how physical forces in adipose tissue mediate breast cancer progression. I was recently awarded a National Science Foundation graduate research fellowship to continue pursuing this project.

Beyond research, I became involved with several outreach activities at Cornell. I participated in a partnership between the Cornell Physical Sciences Oncology Center and the Ithaca Cancer Resource Center that allowed me to directly engage with cancer patients in the local community.

In addition, I partnered with a local elementary school to design and teach a supplemental set of classes to students about human physiology. Finally, I led an interactive demonstration about imaging modalities to detect brain cancer for the annual Cornell Girl Scout Engineering Day.

I am grateful for the generosity of Tau Beta Pi as the first year of my graduate education comes to an end. The TBH Fellowship funded my research and gave me time to build these meaningful relationships within Ithaca through outreach. I hope to continue paying this support forward as I advance my academic career in the future.
Rachel F. Bellisle, RI B ’18  
_Fife Fellow No. 219_

After graduating from the University of Rhode Island in May 2018 with a B.S. in biomedical engineering, I began graduate school at MIT with the MIT-Harvard Health Sciences and Technology program. I am pursuing a Ph.D. in medical engineering and medical physics with a focus in bioastronautics.

During my first year of graduate school, I was given the opportunity to perform rotations through different labs and projects before making a final decision in the spring. I met with many potential labs and advisors during this time and ultimately performed two rotations, both in the Human Systems Lab within the MIT Aero-Astro department. My first project focused on bioenergetics and the metabolic costs of running in Earth, lunar, and Mars gravity, which resulted in the start of a participant study using a wearable metabolic system. My second project involved analyzing inertial measurement unit (IMU) data from a previous exoskeleton study, to determine the changes in stability and the effects of increased physical loading during exoskeleton use. Through this project, I developed an algorithm to determine torso lean using an IMU at the sternum and improved a pre-existing algorithm which extracts gait events using IMUs on the feet.

Starting this summer, I have chosen to work with Professor Dava Newman in the Human Systems Lab and will likely perform research related to space suits. Specifically, this includes a gravity loading countermeasure suit, which applies a vertical load to the body to simulate Earth gravity while in microgravity. I am also interested in research with dual applications in Earth and space, and I plan to explore the potential applications of this suit in therapeutics and cerebral palsy on Earth.

I would like to thank TBP for their generous support during my first year of graduate school and the start of my research career.

Latarence J. Butts, FL H ’18

_GEICO Fellow No. 3_

After earning a B.S.in electrical engineering from Florida Agricultural and Mechanical University, I spent the summer as an electromagnetic compatibility intern for Northrop Grumman’s system engineering and integration test program in San Diego, CA. This allowed me to build on experiences that I gained over the previous summer, which I spent as an intern in Northrop Gruman’s airworthiness program.

I have begun work on modeling high frequency devices as a doctoral academy fellow at the Univ. of Arkansas. Already, I have benefitted greatly from the advising of Dr. Samir El-Ghazaly and accompanying faculty in the electrical engineering department. As integrated circuits continue to shrink in size following technological achievements and improved fabrication methods, smaller device dimensions can pose several design challenges as their behavior becomes modified and parasitics become multiplied. Therefore, reliable models must be formed in order to accelerate development and optimize resource allocation.

In addition to modeling high frequency devices, I have been active in collaborative research focused on integrated microwave photonics which promises magnitudes of improvement for signal processing capabilities and would lead to drastic transformations in the aircraft industry. Apart from studies, I run a startup called Runwae that provides a free online platform for entrepreneurs to expand their brand while providing influencers a passive source of revenue through social media marketing. We look forward to moving into the tech space soon! I’m extremely grateful to be selected as a TBP Fellow. The support has been invaluable throughout this journey and provides a constant reminder of my commitment to excellence in times of adversity. Thank you again GEICO and Tau Beta Pi!

Alisha Y. Chan, MD B ’17  
_Nagel Fellow No. 21_

I am finishing my second year of graduate study in environmental engineering at Yale University. I am pursuing my Ph.D. under the guidance of Dr. Michelle Bell focusing on topics related to environmental justice and equity. During this past year as a Tau Beta Pi Fellow, I have had the pleasure of conducting exciting research and volunteering at STEM outreach events.

My dissertation project seeks to provide scientific evidence to aid policies and practices that will optimize both socio-demographic and ecological benefits that can result from the installation of stormwater best management practices (BMPs), a type of stormwater management technique that uses the natural environment and/or community-based alternatives to treat stormwater runoff in a way that is less invasive to the environment than the traditional pipe to stream method. Studying the socio-demographic effects in addition to the environmental effects of implementing BMPs will help policy makers make the most informed decisions when selecting, locating, and maintaining BMPs.

As a volunteer for Yale’s GradSWE, I have had the opportunity to encourage young women to pursue STEM through fun interactive activities. For example, I volunteered at an event where girl scouts made LED patches for their uniforms and an event where middle schoolers made rockets and telescopes.

In addition to research and STEM outreach, I’ve attended conferences, finished my coursework, and worked as a teaching assistant for the course, Introduction to Environmental Engineering. I was also notified of my first publication as a first author, which received the 2019 Best Case Study Award in ASCE’s Journal of Sustainable Water in the Built Environment.

I am incredibly grateful for the support and opportunities the TBP Fellowship provided me. I plan to continue to conduct research passionately and become a role model to others interested in pursuing STEM.

Darcie Christensen, UT Γ ’17

_Record Fellow No. 6_

This May, I will finish my master’s degree in environmental engineering. It has been an interesting year of learning much about water quality and wastewater treatment. I have come to realize how important this precious resource is and how much people take it for granted. I am also concurrently working on my doctorate in engineering education. This is where my research is focused.

In November, I had the opportunity to present my research at the World Engineering Education Forum in Albuquerque, New Mexico. The research was focused on a former office space I helped transform into a mobile, active learning classroom. I conducted a research study in the classroom focused on determining students’ ideal learning environment. Many classrooms are designed by administrators with no input from students. It was found that students preferred flexible spaces that could adjust to different teaching methods. For example, students want to be facing the instructor if the class is lecture-style, but if active learning activities are going on, they would prefer to be in small groups.

I have also been working on a project funded by the National Science Foundation. We are analyzing the relationships between student performance, self-efficacy, nervousness, salivary biomarkers, and electrodermal activity (emotional arousal) during a practice Statics exam. Exam experience is important, especially in the context of engineering student retention. This year, we began analysis on the first two semesters of participants. We also collected data from 160 additional participants. I presented exploratory, preliminary results about some relationships between self-efficacy and electrodermal activity at the American Educational Research Association in Toronto, Canada in April.

I will finish my Ph.D. in two years and then intend to work in engineering student recruitment and retention. I appreciate the support of TBP in my graduate education.
Elizabeth L. Crist, MO I ’17
Record Fellow No. 7

After graduating from Washington University in St. Louis with a degree in biomedical engineering, I began doctoral research at the University of Minnesota in the biomedical engineering Ph.D. program. I joined Dr. David Wood’s living devices lab to study cancer cell migration and metastasis using 3D microfluidic technology.

The aim of my project is to investigate the plasticity of cancer cell migration in metastasis, or the dissemination of cancer cells from a primary lesion to a secondary site. Cancer cell migration is an integral component of the metastatic cascade, and various cellular and environmental factors control modes of migration. Over the past year, I developed a physiologically-relevant tumor model and a tunable 3D microfluidic device that enables investigation of migration throughout the early stages of metastasis (i.e. local invasion and intravasation).

Outside of the lab, I am involved in several outreach programs, including Science for All (SFA), Women in Science and Engineering (WISE), and Graduate Women in Biomedical Engineering (GWBME). As a group leader in SFA, I design monthly experiments to teach middle-schoolers about science and engineering. Through participation in WISE, I am paired with a female undergraduate student to help mentor her throughout her undergraduate career. Finally, as an officer of GWBME, I work to bring together the women in our department to create a culture of support and empowerment.

In addition to outreach, I love playing sports, weight lifting, and learning to cook new food. The TBP Fellowship has been paramount in my ability to pursue my academic, athletic, and extracurricular passions. With the support of Tau Beta Pi, I am able to improve therapeutic options for cancer patients through research and impact the next generation of scientists through outreach. I am deeply grateful and honored to have received this fellowship, and look forward to paying it forward throughout my professional and personal pursuits.

Carlisle R. DeJulius, OH K ’18
Record Fellow No. 8

I began my graduate career in biomedical engineering at Vanderbilt University in August of 2018. I am pursuing a Ph.D. as a member of the Advanced Therapeutics Laboratory under the mentorship of Craig DuVall. My work is focused on formulating antioxidant, polymeric drug delivery systems for arthritis applications.

Currently, I am working to characterize the antioxidant properties of a library of synthetic polymers by tuning both the drug content and hydrophilicity to optimize bioactivity. My work to date has yielded a lead candidate from our library that we are moving forward to in vivo testing in a mouse arthritis model. During this project, I had the opportunity to mentor a high school student through a three-week research internship. I have also taken on an undergraduate student who made fantastic progress characterizing gene expression patterns in arthritis tissue during the spring semester, and is staying on for the summer to begin a joint-targeted nanoparticle project.

Finally, a visiting Chinese scholar has begun working closely with me to advance the antioxidant library I have formulated into a more comprehensive, microsphere-based drug delivery strategy for arthritis. To take my work in a clinically translational direction, I joined an exclusive training grant offered through the Vanderbilt Institute for Surgery and Engineering and the National Institutes of Health to take biomedical advances from bench to bedside. I also applied for and was awarded the prestigious National Science Foundation Graduate Research Fellowship.

These opportunities will allow me to further my graduate work making advances in the field of antioxidant drug delivery in the complex joint environment. After my Ph.D. work, I plan to pursue an academic career as a professor and researcher in the area of cartilage diseases.

Catherine C. Henry, VA A ’16
Record Fellow No. 10

I am currently pursuing a Ph.D. in biological engineering at the Massachusetts Institute of Technology. This past year, I completed my graduate coursework, served as a teaching assistant for the introductory lab to biological engineering, and continued my research in Dr. Angela Koehler’s lab.

Dr. Koehler’s lab is focused on discovering and developing small-molecule probes for oncogenic transcription factors that are considered “undruggable.” A major hurdle in chemical probe and drug development is assessing whether a small molecule binds to its intended target. The goal of my research is to develop a high-throughput platform that enables rapid identification of proteins that bind to a small molecule. This technology would increase the rate of probe discovery and drug development for a wide variety of illnesses.

Outside of classes, teaching, and research, I serve as the academic chair of the biological engineering graduate board and act as co-director of the entrepreneurship initiative in the MIT Biotech Group. In these roles, I plans seminars and other events, and collaborate with resources that help students teach and explore career options.

In the future, I hope to become an industry leader in platforms that advance the discovery and development of small molecule therapeutics for difficult disease targets. I am grateful for the TBI Fellowship, which has provided me with the support and flexibility to continue research on focused-ultrasound-mediated blood brain barrier disruption and gene delivery for the treatment of Parkinson’s disease.

Delaney Fisher, TN A ’18
Record Fellow No. 9

Following my graduation from the University of Tennessee at Knoxville with a B.S. in chemical engineering, I have begun my doctoral studies at the University of Virginia in biomedical engineering. In my first semester, I completed rotations in Drs. Mete Civelek’s and Rich Price’s labs, where I worked on functional studies of risk genes for diabetes and gene delivery to the brain via focused ultrasound, respectively. I have since joined the Price lab to continue research on focused-ultrasound-mediated blood brain barrier disruption and gene delivery for the treatment of Parkinson’s disease.

I’ve been fortunate to already attend two conferences: the Mid-Atlantic Diabetes Symposium and the Focused Ultrasound Symposium. Additionally, I was able to attend a week-long workshop on Therapeutic Ultrasound in Les Houches, France. At this workshop, I was able to attend several lectures regarding fundamental concepts of my research field as well as present my current work and research plans. Support from Tau Beta Pi as a fellow has enabled me to undertake opportunities like these.

In addition to research, I have completed the core courses for biomedical engineering, which concentrate on computational modeling of physiological processes. I am also excited to start a new role in which I will be mentoring senior undergraduates that are pursuing graduate school. Aside from academics, I have enjoyed hiking and attending the many free, local concert series with my new graduate friends. I am extremely grateful for the alumni who give back to allow such fellowships to exist and for the Association as a whole which has taught me invaluable skills and has sparked countless friendships.
Emily A. Jewell, WI A ’17
Record Fellow No. 11

Upon graduating from the University of Wisconsin-Madison with bachelor’s degrees in engineering mechanics and mathematics, I submitted my first journal article for review on my work predicting joint damping. Over the summer, I continued structural dynamic research at NASA Langley Research Center where I experimentally examined structural-acoustic interactions. I primary authored a paper and presented this work at the International Modal Analysis Conference in Florida (Jan. 2019).

In Fall, I began work towards my master’s and Ph.D. in aeronautics & astronautics at Stanford University. I have focused my coursework on material that will afford me a holistic understanding of the aerospace analysis process. Additionally, I have begun research on developing computational fluid dynamics for supersonic retropropulsion (SRP). SRP is when a space vehicle re-starts its engines while descending supersonically through a planet’s atmosphere. This is done to slow down the vehicle and will be a critical technology if humans hope to land larger payloads on Mars or other planets. Therefore, I plan to pursue this topic for my Ph.D. research to bring technological advancements to the commercial space industry.

Beyond the classroom, I have been active in the Bay Area through community volunteering, organizing social networking events for Women in STEM, and participating in various outdoor clubs. Moreover, I attend monthly professional development workshops to further cultivate my leadership skills, write monthly to elementary and middle school girls to encourage their confidence in STEM, and seek community gender equity engagements to push for respect and representation for women and minorities in male dominated activities and fields. I am immensely grateful for the opportunities TBP as afforded me since my induction, especially this graduate fellowship, and look forward to my future with the honor society.

Beau Johnson, AL G ’18
Arm Fellow No. 10

Since graduating from the University of Alabama at Birmingham with a degree in mechanical engineering, I have begun my doctoral program at Vanderbilt University. I have focused on courses related to dynamics and control while serving as a teaching assistant for senior design and a research assistant with Dr. Michael Goldfarb.

For my senior design I provided guidance and mentorship for multiple projects including prevention of building-related bird strikes – specifically targeting federally protected migratory birds, the development of a low-cost prosthetic hand for a 9-year-old boy, and the development of a mechatronic actuator for a novel surgical robot. My experience has allowed me to positively impact the academic experience of future engineers while also expanding the breadth of my engineering knowledge and capabilities.

My research is focused on augmenting human performance with assistive technologies. The primary aim is to expand the range of applications for exoskeletons, orthotics, and prosthetics. My current projects include the design and evaluation of hardware and control schemes to improve the efficiency of running and swimming in healthy individuals and to provide assistance and rehabilitation to individuals with gait impairment.

In the future, I hope to continue my investigation of the aforementioned projects and utilize the results to inform the design of assistive technologies that may be translated and produced such that the benefits observed in research may make a positive impact on the lives of the individuals they are intended to assist.

Phiwat Kloomkaew, AL E ’18
Centennial Fellow No. 33

After graduating from the University of South Alabama (USA), I moved to Austin, to adjust to the city’s culture and get an early start on my research. At the University of Texas at Austin, I volunteered in Dr. Freeman’s polymer membrane lab, shadowing a second-year graduate student and helping him measure the permeability of his membrane samples using the bubble flow permeation system. This experience was unique and helped me pick my Ph.D. advisor.

I am co-advised by Dr. Benny Freeman and Dr. Joan Brennecke, chemical engineering professors and experts in the fields of polymer membrane and ionic liquid, respectively. I am funded by the new National Science Foundation engineering research center — the Center for Innovative and Strategic Transformation of Alkanes Resources. My research project involves studying an ionic liquid/high-flux polymer system for separation of light hydrocarbon gases at the wellhead. Membranes are great materials for this application due to their modular nature, lower energy consumption, compared to the conventional and energy-intensive cryogenic distillations. My study will have a great economic and environmental impact in the shale gas industry and revolutionize the production of useful chemicals.

Outside my research, I am involved with a few organizations on campus. I served as webmaster for the graduate engineering council and became an avid learner in Texas Tai Chi. Moreover, I put my American Sign Language skills (learned at USA) to good use by helping the science club at the Texas School for the Deaf hold fairs, STEM-related activities for high school students.

I am grateful to Tau Beta Pi for awarding me the fellowship and appreciate the opportunity to stand with the other TBP fellows and help shape the future of engineering and science. Thank you for believing in me and investing in my future!
I graduated from California State University Sacramento in 2015 with a bachelor’s degree in civil engineering. Before starting graduate school at Stanford University, I got married and changed my last name from Kovalchuk to Dronov.

My first year has been focused on completing coursework for the environmental engineering Master of Science (MS) program and exploring research opportunities in fluid mechanics as an NSF graduate research fellow. Some of my most fascinating classes have included transport and mixing in surface water flows, ocean waves, modeling environmental flows, and sediment transport modelling. Through these courses, I have gained skills such as analyzing field data sets, building a 2D non-hydrostatic solver, and modeling sediment flux from the Sacramento-San Joaquin River Delta into the San Francisco Bay.

I developed experience in the Stanford Environmental Fluid Mechanics Laboratory by running experiments of flow over model vegetation in a large recirculating flume. Studying canopy flows is important for understanding ways that “green infrastructure” can be implemented in coastal communities.

In the coming months, I will complete my MS program and continue research as a candidate in the degree of engineer program. I will then seek employment to gain experience for a California Professional Engineer’s license, since I have already passed the National PE Exam in Civil: Water Resources & Environmental. I am incredibly grateful for and honored by Tau Beta Pi’s support in my graduate studies.

In the upcoming years of my Ph.D., I will be using yeast surface display and protein engineering to elucidate the mechanisms by which checkpoint receptors function. Checkpoint blockade therapies are being developed by many groups, some of which have FDA approval, but the mechanism by which they function is still unclear. The elucidation of this mechanism will contribute greatly to the cancer immunotherapy community, and I look forward to developing a solution to this problem in the upcoming years of my Ph.D.

I am profoundly grateful for and honored by Tau Beta Pi’s support in my graduate studies. My research focuses on developing an environmentally-validated metabolic model for anaerobic microbial consortia centered on gut fungi. Engineered with guidance from such a predictive model, these consortia have immense potential for the valorization of recalcitrant lignocellulosic biomass via bioproduction of things like biofuels and pharmaceuticals. However, the microbes we are interested in are poorly understood and therefore require significant method development to study.

This year, I worked to develop a genome-scale metabolic model of a novel anaerobic gut fungus that our group isolated from the sheep gut microbiome. I aim to complete this model and validate it with metabolic flux analysis experiments, before ultimately developing models for metabolism of multi-species anaerobic consortia. The end goal is a model that can suggest stable microbial communities for conversion of woody biomass to useful products in a single pot.

Outside of research, I have been involved in scientific outreach by participating in “family science nights” at local high schools and judging the Santa Barbara County Science Fair. I find these experiences extremely rewarding and I appreciate the opportunity to pay forward the generosity the Tau Beta Pi community has shown me. I am honored to have been selected as a TBP Fellow and I am immensely grateful for the support Tau Beta Pi has given me.
After graduating from the University of New Mexico with my B.S. in chemical engineering and a minor in mathematics, I returned to Los Alamos National Laboratory for a graduate internship position. I worked on separating lanthanides, specifically Ce(IV), Ce(III), Y(III), and Nd(III) using ion imprinted polymers.

In September, I began my graduate studies and lab rotations at the Univ. of Michigan in the biomedical engineering department. I have officially joined Dr. Joerg Lahann's group within chemical engineering. I have primarily been focused on coursework, shadowing, and learning techniques within the lab.

This semester, I am working on developing nanoparticles via electrohydrodynamic co-jetting as therapeutics for glioblastoma, and to understand the underlying transport phenomena. Each year, approximately 3 million adults in the U.S. are diagnosed with brain disease, but existing methods to treat them are insufficient primarily because of the inability of therapeutics to cross the Blood Brain Barrier (BBB) — a biological divider between the brain and circulating blood. The transport processes of the BBB are crucial for developing successful therapeutics, but the understanding of such processes is still at its infancy.

Outside of my graduate studies and lab, I have continued my participation in the Society of Women Engineers and Tau Beta Pi. I recently accepted an officer position as networking chair in SWE. I was also selected to join TBP's Student Advisory Board. I am grateful for the opportunities Tau Beta Pi has given me and continues to give me.

Carly J. Romnes, NM B '18
Tau Beta Pi Fellow No. 820

After completing my bachelor's degree in nuclear engineering at the University of New Mexico, I completed my third internship at NASA's Marshall Space Flight Center. My research focused on characterizing the piezoelectric and pyroelectric properties of the 3D-printed sensor that I had developed the previous summer.

In the Fall, I began my graduate studies at the University of Illinois at Urbana-Champaign pursuing master's and Ph.D. degrees in nuclear engineering. I have completed several courses related to nuclear materials and materials science and engineering, wrote several successful fellowship proposals, performed research, and became the president of my local TBP alumni chapter.

I have decided to accept the NASA Space Technology Research Fellowship to support the remainder of my graduate research and will be investigating additive manufacturing for applications in extreme environments. Additionally, I have participated in several research projects in both the nuclear, plasma, and radiological engineering department and the materials science and engineering department.

My master's thesis topic is on utilizing Positron Annihilation Spectroscopy to better understand radiation damage processes in neutron-irradiated iron-chromium alloys. This summer, I plan to develop a testing station for this research, write a journal publication summarizing the data we have obtained, and begin writing my master's thesis. Furthermore, I have utilized transmission electron microscopy to investigate the effects of annealing on HfAlB2 thin films. I have also been involved in research on boron nitride nanotube-ceramic composites for space applications.

Throughout my time here, I have continued to develop my materials characterization skills to support my doctoral research. I want to thank Tau Beta Pi for the amazing opportunities the TBP Fellowship has given me, and for fostering my continuing education and career development.
Simone M. M. Stanley, DC A ’17
Zimmerman Fellow No. 7

I am currently a graduate student at Georgetown University studying biotechnology. I was one of only five students selected for the Entrepreneurship track and will receive my master’s degree this May. The Entrepreneurship track includes a year-long capstone internship at a biotechnology company. During my capstone internship with the start-up company GeneWhisper, I worked on product development as a bioinformatics scientist and digital strategy as a marketing intern.

During my time at Georgetown, I also served as the liaison to the biotechnology master’s program for Startup Hoyas Med, which is a student-led organization that brings CEOs to campus to network with students and young entrepreneurs. My coursework has included FDA case studies, intellectual property, and molecular medicine.

My career interests include addressing health disparities with the use of technology. The future of biotechnology will include genomics studies and more patient-centered healthcare. My plan is to be on the cutting edge of genomics and next-generation sequencing. As I begin my career in healthcare innovation, I am determined to speak up and advocate in spaces where health disparities and global health implications are discussed.

Marina Swanepoel, AL E ’17
Tau Beta Pi Fellow No. 821

The TBP Fellowship has afforded me with the time to prioritize my schoolwork, career, and interests.

I have been able to complete a M.Sc. in mechanical engineering at the University of South Alabama while interning at Automation and Controls Engineering, LLC. At ACE, LLC I am learning to design advanced distributed control systems and programmable logic controller applications. I am surrounded by professional engineers that have so far counted as great mentors, role models and friends. With their guidance, I work to provide a cost-effective solution and immediate starts on migration and modernization projects for specialty chemicals, pulp & paper, and oil & gas industries. After graduation, I accepted a full-time position as a control systems engineer at ACE.

Due to the support that the TBP Fellowship has provided, I have been able to spend time volunteering at local high school cross country meets, track and field meets, and training camps. As a former athlete, running and track and field has always been something that I am very passionate about. This has been an excellent opportunity to inform students about college, and share my experiences as an engineering student athlete. As I settle in as a full-time employee, I hope to spend more time helping student athletes in the future. Also, I look forward to learning more, gaining work experience, and obtaining my PE license someday.

I consider myself lucky beyond measure to be a TBP Fellow and I sincerely thank the Association and my advisor Dr. Sally Steadman for supporting my studies and helping me achieve my goals.

Chris Torres, NM B ’18
Williams Fellow No. 39

After I completed my B.S. degree at the University of New Mexico, I began my graduate studies towards a Ph.D. in chemical engineering at the University of Illinois at Urbana-Champaign. I have completed over half of my required classes and joined a research group related to sustainability in industrially-relevant chemical oxidation processes.

Petroleum cracking operations provide alkene compounds, which are selectively oxidized to epoxides for use in the plastic, adhesives, and engineering fluids industries. Under the guidance of my research advisor, Prof. D. W. Flaherty, I began research into liquid-phase oxidation reactions over titanium-bearing microporous materials to help sustain current standards of living while minimizing the resultant impact on the environment. I hope to co-author two scientific publications by the end of 2019 as a result of kinetics, spectroscopy, and calorimetry experiments performed so far in my research group relevant to this topic.

I was chosen as the first-year representative for the graduate student advisory council in my department, where I helped organize a research symposium, prospective-student recruitment weekends, and extracurricular activities for my cohort. I also spent time volunteering with a local food bank and a girls in STEM awareness program.

For my next years here at Illinois, I want to find new opportunities to mentor minority and at-risk youth as well as become more involved in my community. I will also begin a teaching certificate program where I can receive additional training and guidance on my way towards an eventual teaching job after I graduate with my doctoral degree. I’d like to thank Tau Beta Pi for supporting my graduate studies. It has been an awesome privilege to be a TBP Fellow, and I hope to pay forward my experiences as a member towards the next generations of engineers and leaders.

Tranice’ R. Warner, CA P ’17
Matthews Pi Fellow No. 21

Since graduating from California State University, Fresno with my B.S. in civil engineering, I have enrolled in the Ph.D. program in the department of civil and environmental engineering at the University of Southern California, joining the lab of Dr. Adam Smith. I have completed the majority of my coursework towards a M.S. in environmental engineering, and this year, I am primarily focused on my research: the development of novel membrane materials that reduce the occurrence and severity of fouling in membrane bioreactors for wastewater treatment.

Polymeric membranes are widely used in water treatment; advancements in membrane technology have produced membranes that are flexible and easy to fabricate at low cost. However, the low surface area and hydrophobic characteristics of traditional polymeric membranes result in unfavorable properties such as poor chemical resistance, limited lifetime, and membrane fouling, which all increase the overall energy and capital costs of operation. Inorganic nanomaterials, such as molybdenum disulfide, can potentially mitigate membrane fouling while maintaining stable permeate flux when combined with the polymeric matrix to form a nanocomposite membrane. Molybdenum disulfide is both hydrophilic and antimicrobial, which can reduce the rate and severity of fouling deposition. Thus, I have developed and tested the antifouling performance of molybdenum disulfide thin film nanocomposite membranes and compared them to the performance of commercial membrane samples and other hydrophilic membrane coatings.

Anti-fouling membranes mitigate the economic, environmental, and social costs of water treatment by reducing the energy demand on wastewater treatment systems prone to severe and irreversible fouling. I have presented my research as a poster entitled, “Molybdenum Disulfide/Polyethersulfone Nanocomposite Membranes: Fabrication and Performance during Filtration of a Synthetic Biofouling Solution” at the 2019 AEESP Research and Education Conference at Arizona State University.
Nathaniel Weger, IA B ’18
King Fellow No. 57

I completed my bachelor’s degree in mechanical engineering at the University of Iowa, where I focused my time on classes, researching biomass energy, and working to combat rural isolation with Engineers in Action. Next, I started the long road to a Ph.D. in mechanical engineering at the University of California, Berkeley.

During my first year, I’ve shifted my research focus to energy storage, in the form of thermophotovoltaics. Cheap energy storage is the best way to enable a quick adoption of sustainable energy sources, and thermophotovoltaics are well-positioned to make that a reality. Much of my time has been spent in class and in the laboratory, gaining an understanding of the physical processes that govern radiative and conductive heat transfer and learning the techniques used to experimentally see how light and materials are interacting.

I have continued my volunteering efforts with Engineers in Action, mentoring undergraduate students in the process of doing collaborative pedestrian bridge projects with rurally isolated communities in developing countries. I also recently began volunteering with Cleantech Open, an international startup accelerator for companies working in clean technology. It’s been inspiring and enlightening working with teams that have built businesses intent on improving the world.

I plan to continue learning and discovering new things, working to advance the field of thermophotovoltaics to the point where it can be used as a commercially viable form of energy storage. I love what I’m doing here, and I would like to thank the people of Tau Beta Pi for this fellowship and for believing in me and my ability to make good things happen.

Hao Xing, MA B ’16
Tau Beta Pi Fellow No. 822

This past year has been exciting and productive. Upon receiving the TBP fellowship, I entered the third year study of my doctoral program in the department of biomedical engineering at Yale University. After numerous discussions with my thesis committee members, I finalized my research focus to engineering a cell-derived biomaterial to improve diabetic wound healing through the scope of biomechanics. I presented my preliminary findings to the thesis committee and the public, and I was qualified as a Ph.D. candidate.

The collaborative environment at the Kyriakides’s lab allows me to explore and produce a clinically translatable product to help the diabetic populations. During the preparation of my candidacy, I authored and submitted a review paper to a high impact journal: Biotechnology Advances, providing an overview of different biomaterial approaches to engineer stem cell functions.

In addition, I co-authored three studies in the fields of biomaterial and extracellular matrix, showing promising results and the underlying mechanism of a novel type of genetically modified tissue-derived biomaterial to treat the diabetic wound. The resulting works are published in Biomaterials, ACS Applied Materials & Interfaces, and Matrix Biology.

Outside of research, I continued my Canaan-Yale fellowship as a project leader to provide scientific and strategic insights for the healthcare investment team and the portfolio companies. Currently, I am assisting a general partner to write an opinion article to Biocentury to address the drug pricing issue and re-envision the industry model.

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