2017 Fellow Reports

The reports of Tau Beta Pi's 83rd Fellowship Program and the 2016-17 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 24 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.

Shannon E. Anderson   Christopher A. Argento   Sean M. Bittner   Mohamed A. Bouzaghrane

Shannon E. Anderson, MA H '16
Tau Beta Pi Fellow No. 810

After graduating from Boston University with a B.S. in biomedical engineering, I began my doctoral program in BME at the Georgia Institute of Technology and Emory University. This year, my focus has been on establishing the groundwork for my Ph.D. thesis and completing necessary courses.

I have joined the labs of Dr. Jang at Georgia Tech and Dr. Willett at Emory, as a co-advised student. Dr. Jang's lab focuses on skeletal muscle stem cells in aging and injury, whereas Dr. Willett's lab is focused on orthopedic trauma and osteoarthritis. This unique advising situation allows my project to sit at the cross-section of these labs, with a focus on skeletal muscle regeneration in volumetric muscle loss injuries. I have been working on an in-depth characterization of the volumetric muscle loss injury model as well as isolating muscle stem cells and other support cells for use in vivo transplantation.

Outside of the lab, I am involved with a few different organizations doing educational STEM outreach in the Atlanta area. These activities are led by graduate students and have included leading demonstrations at a local middle school during their science club and at various festivals throughout the year. Additionally, this summer I will be teaching biomechanics modules at a STEM-themed summer camp.

I am excited to continue my development of a treatment for functional recovery in volumetric muscle loss injuries, to continue my community involvement, and to eventually build a career that allows me to have lasting clinical impact. This fellowship year has been incredibly rewarding, challenging, and productive, and it would not have been possible without the generous support from Tau Beta Pi.

Christopher A. Argento, MD A '16
Zimmerman Fellow No. 5

After graduating from Johns Hopkins University, I traveled to Leuven, Belgium for a summer internship at IMEC. A leading microelectronics center, IMEC has a division dedicated to the intersection of nanotechnology and life sciences. Here, I took part in the development of a microfluidic droplet platform that has the potential to efficiently culture and screen different strains of yeast. Each microdroplet could effectively replace a traditional shake flask or bioreactor. The applications are typically Belgian, ranging from the fermentation of beer to chocolate.

I then returned to JHU to complete a master's degree in chemical and biomolecular engineering. I engaged in advanced coursework covering the areas of polymers, nanomaterials, and biomolecular systems. In these courses, I focused primarily on nanotechnology and bioengineering, which I believe can be integrated to form cutting-edge therapies.

Following my master's degree, I joined Biogen in Cambridge, MA, as an engineer. Aligned with my interest in biotechnology, I now have the chance to support technical development efforts in the emerging field of gene therapy. Specifically, I will focus on downstream purification development. It is vital that I contribute to Biogen's efforts to address devastating and yet-untreated diseases.

I am overwhelmingly grateful for the opportunities afforded to me as a TBΠ Fellow. This past year has allowed me to develop my engineering skills through a plethora of graduate courses and an international research experience. These skills will surely serve me well as I venture into the field of biotechnology.

Sean M. Bittner, AL A '16
Fife Fellow No. 209

After graduating from Auburn University, I worked for the City of Saint Petersburg as a recreation leader and nutrition curriculum developer. In this role, I developed nutrition curricula and managed the operation of a new service site for the Summer Food program.

In August, I began my Ph.D. studies in bioengineering at Rice University. After completing research rotations with three faculty members, I joined the laboratory of Dr. Antonios Mikos, who specializes in tissue engineering and regenerative medicine. Since joining the lab, I have been working on a project focusing on osteochondral tissue engineering. The aims of the project are to use three-dimensional printing (3DP) technologies to design a scaffold that facilitates bidirectional growth factor release. This scaffold would be implanted into osteochondral defects arising from injury, where the synergistic effects of the growth factors and scaffold layering would induce healing in the cartilage and subchondral bone, which normally has a very limited capacity for self-regeneration.

I have also taken a number of required and elective bioengineering courses to improve my background knowledge in the field. I have also sought out a number of professional development opportunities. I attended the Society for Biomaterials Conference to network with various experts in the field and to attended different workshops.

I also took a course in medical technology and entrepreneurship, as this aligns well with my interests and is a growing market in the Houston area. I plan to continue working on my research project and pursuing further opportunities to share and collaborate on my work. I am very thankful to Tau Beta Pi for supporting my graduate education through the Fellowship program.

Mohamed A. Bouzaghrane, DC A '15
Nagel Fellow No. 18

This past year, I started my master's degree in transportation systems at the University of California, Berkeley. The program allowed me to customize my coursework to my own personal interest. I was able to take classes in transportation operations, economics, statistics, behavioral modeling, and machine learning.

The variety of courses allowed me to discover new passions and increased my interest in the field of machine learning. Following this passion, I was able to take part in the development of an open source phone application aimed at the instrumentation of end-to-end travel experiences. This application also has an objective of learning about people's travel behavior using deep learning algorithms, collect travel data in a cheap and efficient way, and allow researchers to implement nudges and observe the resulting travel behavior.

I am planning on continuing my career in transportation consulting and being able to introduce new methods from the computer science and machine learning fields to the transportation engineering field.

Savannah Horsley (Brown)

Felipe L. Carvalho

Matthew A. Clarke

Sarah A. Dean

Tau Beta Pi and the ΤΒΠ Fellowship have truly allowed me to pursue my dream and find new passions and talents. I am thankful for all the support from the organization and fellow Tau Bates.

Savannah R. Horsley (Brown), MI Z '15
Arm Fellow No. 8

This past year, I began pursuing a master's degree in biomedical engineering with a concentration in translational health technology at Case Western Reserve University with a target completion date of August 2017. My degree program focuses on business development and the translation of engineering technologies from research into industry, building on my strong engineering undergraduate education that I received at Kettering University.

In addition to challenging yet fulfilling coursework, I have held a part-time internship at a medical device start-up company spun out of the Cleveland Clinic Foundation. This opportunity has allowed me to experience the environment of a small company first hand, as well as directly gain insight into the process of bringing a medical device from concept to market. This valuable exposure in combination with the uniqueness of my master's degree program has helped me to grow both personally and professionally.

This summer, I will focus on completing my master's degree through a project focusing on stress quantification in hospital ICU patients. I am pursuing various employment opportunities for after graduation in the biomedical engineering field that would allow me to combine my prior employment experiences and newly obtained skills.

The ΤΒΠ Fellowship award has provided me the necessary support to successfully complete my graduate education, and I am very grateful for the opportunity.

Felipe L. Carvalho, FL E '14
Williams Fellow No. 37

The Tau Beta Pi fellowship was of extraordinary help and greatly contributed to the success of my graduate career. In the past year, while being sponsored by Tau Beta Pi, I successfully published two first-author, peer-reviewed research articles on lightning phenomena (my research topic). Both my publications appear in the *Journal of Geophysical Research – Atmosphere* (doi: 10.1002/2016JD025863 and doi: 10.1002/2016JD026202), where I acknowledge Tau Beta Pi as a funding source. With the financial help, I purchased my own website domain (felipelenz.com) so I can make accessible my contributions to science and highlight the milestones I achieve as a graduate student at the University of Florida. Lastly, the financial support Tau Beta Pi has given me will be put to use later this year when I present my research in domestic and international scientific conferences. I am preparing a paper to be presented in Cape Town, South Africa in August 2017 and another paper to be presented in Nagoya, Japan in September 2017. I am thankful for Tau Beta Pi's support towards my doctorate degree and am honored to have served as a ΤΒΠ Fellow.

Matthew A. Clarke, DC A '16
King Fellow No. 55

During the past year as a ΤΒΠ Fellow, I began graduate studies in the department of aeronautics and astronautics at Stanford University. Upon graduating with a bachelor's degree in mechanical engineering from Howard University, I devoted my first two quarters towards coursework. These courses now lay the foundation for my research which commences this spring quarter.

Under the supervision of Professor Juan Alonso, my research project focuses on creating a framework for configuration and stability optimization of high-altitude long endurance (HALE) aircraft. The idea of loitering at altitudes above weather and commercial air traffic has been predominantly plagued by the need for a reliable power plant and an optimized aerodynamic shape capable of staying aloft within aero-elastic and stability margins. These aerial autonomous vehicles have the potential to perform a variety of missions ranging from reconnaissance and weather prediction to communications relaying.

I am thankful for Tau Beta Pi's support towards my graduate studies and am honored to have been selected as a ΤΒΠ Fellow. This opportunity helped me to further my graduate studies and I look forward pursuing a career in industry focused on the research and development of revolutionary air and spacecraft technology.

Sarah A. Dean, PA Δ '16
Swalin Fellow No. 1

After graduating with a degree in electrical engineering and Math from the University of Pennsylvania, I began my Ph.D. in electrical engineering at the University of California, Berkeley. My first year consisted of completing foundational coursework, participating in reading groups and research seminars to learn about cutting edge work, and beginning research projects.

My coursework covers the foundations of optimization and statistics. In optimization classes, I learned how to use convex analysis to understand the theoretical guarantees of optimization algorithms in a variety of settings. In statistics courses, I learned about the theory behind model and parameter estimation, and studied analysis techniques for quantitative convergence rates in high dimensional settings.

I am a member of reading groups and seminars that discuss recent work and open problems. I have attended weekly computational imaging lunches, where participants from a variety of research groups give talks on projects in the intersection of imaging, optimization, and computation. In another reading group and seminar, we have discussed modern control problems, where the true system may not be known. We tie ideas from statistics and learning theory to optimal and robust control.

This coursework and reading groups have supported my research projects as a member of Ben Recht's group. In the vein of computational imaging, I implemented algorithms for optimizing microscope illumination for blurred images, and am working on formulations to give heuristics for imaging setups with regard to the signal to noise ratio. I am also working on projects to quantify the performance of controllers on estimated systems, with particular focus on the infinite time horizon linear quadratic regulator case.

Andrew P. Eagan

Ryan A. Gellner

Christie R. Hasbrouck

Nathan C. Kemper

Andrew P. Eagan, NY Γ '16
Best Fellow No. 6

During the past year as a TBΠ Fellow, I have completed my M.S. in technology commercialization & entrepreneurship at Rensselaer Polytechnic Institute's Lally School of Management. My coursework has covered areas such as the business implications of emerging technologies, strategic innovation, corporate entrepreneurship, startup entrepreneurship, and commercializing advanced technologies. I have had opportunities to apply this coursework by serving as a project manager for a consulting firm and by working with an industrial manufacturer to commercialize a new product.

Over the past year, I have conducted research on climate change mitigation, specifically through carbon capture. I reviewed the existing and emerging technologies, explored potential business models for commercialization, and analyzed the legal and regulatory landscape. While this is a challenging problem, it has been incredibly energizing to engage with leaders in academia, industry, and government in an attempt to address it. I am hopeful that I can continue this work in the future.

As I start my career, I intend to continue working at the intersection of engineering and business. I am thankful for the support of my Tau Beta Pi Fellowship and the wonderful opportunities it has afforded me over this past year.

Ryan A. Gellner, WV A '16
GEICO Fellow No. 1

Following graduation from West Virginia University in mechanical engineering, I began my graduate work at Virginia Tech over the summer as a graduate research assistant in the Helmet Lab. I am pursuing a master's degree in biomedical engineering with which I plan to pursue an interdisciplinary career in biomechanics and injury prevention.

I have been working to collect and understand data from youth football players in order to quantify the biomechanical basis of sports-related concussion in pediatric populations. So far, I have studied individual players with elevated head impact exposure. We plan to publish the findings and hope that youth football coaches will use the information to reduce head acceleration in practices and games. I have also completed core coursework with a focus on biomechanics and injury prevention in a variety of fields, including sports injury and automotive accidents.

Outside of class work, I have gotten to explore the great outdoors near Blacksburg, VA (including the Appalachian Trail!), become a part of the entrepreneurship community, and coach a little league baseball team.

I am extremely grateful to Tau Beta Pi for their support of my first year in graduate school. The support has made for an easy transition and allowed me to save for my future. As I move into my career, I hope to obtain my P.E. license, using this to design injury prevention products. Because I have had such incredible mentors at every stage of my academic career, my number one goal is to build up the next generation of engineers behind me through mentoring and leading.

Christie R. Hasbrouck, IN E '16
Tau Beta Pi Fellow No. 811

Shortly after graduating from Trine University, I started my graduate career at Colorado School of Mines. While studying mechanical engineering at Trine, I developed a strong interest in the aerospace field, and my minor in metallurgical engineering introduced me to the field of joining. Therefore, I decided to begin my graduate studies in metallurgical and materials engineering.

During the school year, I worked as a research assistant under Dr. Stephen Liu in the Center for Welding, Joining, and Coatings Research. My research involved exploring laser joining and repair processes for silicon carbide (SiC) ceramics in aerospace applications. This included both developing a braze alloy to maximize the joints' mechanical properties as well as the optimal laser parameters.

Throughout the year, both the behavior of SiC under several varying parameters of a ytterbium fiber laser as well as methods to preheat the SiC samples were explored. The next phase of this project will involve developing a method of manufacture for the optimal braze alloy and designing a mechanism for automatic feeding into the laser chamber during the brazing process.

I would like to thank Tau Beta Pi and its generous donors for their support. While working with Dr. Liu, I learned a great deal about joining aerospace materials from the metallurgical engineering point-of-view. However, this experience also helped me determine that my interests and skills are better aligned with mechanical engineering. Therefore, I will be finishing my graduate studies in mechanical engineering, with plans to continue research within the aerospace field. Upon graduation from Mines, I would like to work on development of materials and improving energy efficiency in the defensive aerospace field.

Nathan C. Kemper, OH B '16
Tau Beta Pi Fellow No. 812

The past year as a TBΠ Fellow has been both busy and exciting since graduating with a bachelor's in biomedical engineering. Over the summer, I was able to research and observe multiple vascular procedures to identify areas of struggle and discover common procedural trends. In doing so, I worked to help identify areas of improvement for future projects at the university.

The summer quickly came to a close though as I matriculated into the University of Cincinnati College of Medicine in August 2016. The medical courses filled my time with topics such as biochemistry, anatomy, and physiology. It also gave me my first opportunities to interact with the patients whose well-being I was hoping to improve through biomedical engineering as an undergraduate.

These experiences have helped me to further my journey in achieving my ultimate career goals of marrying my past biomedical engineering experiences with a MD. I hope to accomplish this by using my newfound clinical knowledge to help bring engineering innovation to medical procedures. More specifically I hope to pursue this within a surgical specialty such as cardiothoracic or vascular surgery.

In order to further pursue this goal, I hope to continue my exploration of medicine by completing clinical research analyzing the patient outcomes of current treatments. Even though my journey is just beginning, I am excited for the upcoming years of learning.

Cassidy A. Laird

Ryan S. Longchamps

Morgan M. Miller

Robert C. Mines

Cassidy A. Laird, SC A '16
Centennial Fellow No. 31

During my year as a TBΠ Fellow, I have completed my first year of coursework towards my master's degree in biosystems engineering. I have learned scholastic and real-world lessons through my experiences with a focus on core courses and literature review for my research. I also worked for the General Engineering Dept. at Clemson University. In this position, I aided the department by managing the undergraduate teaching assistants, supporting the faculty in their jobs, organizing exams, tech support, and other programs.

My courses focused on statistics and design of experiments, sustainability, and water treatment, all highly relevant topics for my major and career path. At the end of the semester, I will have completed my required coursework and will use the summer and fall semesters to complete my research and defend my thesis. I successfully proposed my thesis topic to my committee and since then have been preparing the pre-cultures, materials, and equipment for my project. My thesis is on the effects of phosphorus concentration on algal composition and the bioprocessing potential of the algae. With this research, I hope to further the knowledge of engineered methods of carbon sequestration and developing byproducts.

I plan to graduate in December 2017 and will then enter industry. I hope to find an engineering position related to bioprocessing, with a particular interest in algal bioproducts and carbon sequestration.

I am honored to have been chosen as a Tau Beta Pi Fellow and am grateful for the support, which has allowed me to pursue my graduate level education and prepare me for my role in the engineering field.

Ryan S. Longchamps, AL Δ '15
Spencer Fellow No. 61

During the past academic year as a TBΠ Fellow, I have continued to work toward my master's degree in mechanical engineering at the University of Alabama in Huntsville. The support of the fellowship has allowed me to complete a majority of my course work, successfully defend my thesis, and apply to several Ph.D. programs.

In October of 2016, I was blessed with the opportunity to attend the 231st Electrochemical Society Meeting in Honolulu, Hawaii, to present my work related to in operando neutron imaging of enzymatic electrochemical cells. This research effort strives to investigate the ability of neutron imaging to provide useful data for the characterization of enzymatic electrochemical cells. Further analysis related to this topic enabled me to complete my thesis defense during the spring semester. I am currently completing the remaining course requirements and will graduate in May.

After graduation, I will be beginning my doctoral studies at Pennsylvania State University as a University Graduate Fellow working under the advisement of Dr. Chao-Yang Wang. This opportunity will allow me to further my knowledge of and research in the field of electrochemical energy conversion and storage, bringing me closer to my goal of becoming a professor.

I want to sincerely thank Tau Beta Pi for the assistance during this past year, without which I would not have been able to achieve the aforementioned milestones.

Morgan M. Miller, OH M '16
Fife Fellow No. 210

I became a TBΠ Fellow after graduating with my bachelor's in electrical engineering from Wright State University. I have since made significant progress towards earning my master's in biomedical engineering with a focus in neuroengineering at Wright State University.

In the past year, I have completed all my coursework and have been collecting data for my thesis. My goal was to bridge the gap between engineering and neuroscience and to bring a unique perspective to existing neuroscience research questions with my background in electrical engineering. My thesis project with Dr. Elbasiouny has led to the development of a paradigm for an existing engineering technology and we are studying its effect as a novel treatment for Amyotrophic Lateral Sclerosis (ALS). I have also started learning electrophysiological techniques to study the effects of our paradigm at the cellular level for both healthy and ALS mice.

I have also spent the past year teaching incoming engineering students the basics of engineering math. I have greatly enjoyed sparking passion in young engineering students and encouraging them to study hard and get involved, so they can earn an invitation to Tau Beta Pi.

I have been involved with the TBΠ OH Mu chapter as a graduate student advisor and I have taken on the role of president of the TBΠ Dayton OH Alumni Chapter for 2017. I am so grateful for all the opportunities and support that I have received from Tau Beta Pi over the years. This fellowship has greatly empowered my graduate career.

Robert C. Mines, AL E '16
Tau Beta Pi Fellow No. 813

After finishing my degree in chemical engineering at the University of South Alabama, I began as a Ph.D. student, with fellowship support from TBΠ and the NSF, in biomedical engineering at Duke University with a concentration in systems and synthetic biology. I am conducting research in the lab of Dr. Xiling Shen in the Duke Center for Genomic and Computational Biology.

My research focuses on the integration of ATAC-seq and RNA-seq data to characterize differential patterns of epigenetic and transcriptional regulation to identify genes involved in cancer metastasis and autoimmunity. After target identification, I attempt to rescue diseased tissue utilizing CRISPR interference or activation, or dCas9 P300. My projects include next generation sequencing techniques to identify genes that contribute to colon cancer metastasis and developing dCas9 constructs to suppress pro-inflammatory cytokines associated with autoimmunity in bone marrow-derived macrophages.

In addition, I have taken a diverse array of courses ranging from metabolic network analysis and design to probabilistic pharmacokinetics and pharmacodynamics. Besides having the opportunity to work on team projects outside of my immediate field of study, they have given me immense exposure to the business side of science ranging from patenting your work, creating a start-up, and FDA regulatory processes.

While the transition from chemical engineering to biomedical engineering has been challenging, I truly appreciate the financial and professional support of TBΠ and the NSF. I am honored and humbled to have received this fellowship and to be part of this extraordinary student cohort.

Arman Mohsen Nia   Ryan P. O'Hara

Katherine E. Riojas Felipe Augusto Sozinho

Arman Mosenia (Mohsen Nia), MD A '16
Stark Fellow No. 39

As a fellow, I pursued my interest in the end-to-end process of building novel medical technologies with a master's degree in bioengineering innovation and design at Johns Hopkins University. In the summer, I was a biomedical analyst at the Johns Hopkins Hospital and I spent months going through intense clinical rotations to discover clinical needs. My team and I engineered a device for automating the administration of intradermal injections to expand access to penicillin allergy testing in a hospital setting in order to fight antibacterial resistance. I was able to develop a deep insight into the clinical, regulatory, business, and design aspects of medical innovations. This work resulted in a provisional U.S. patent as well as a paper that is pending submission following the completion of our clinical studies.

I also worked on another project that was aimed to address the lack of access to surgical care in resource poor settings. My team and I developed TechConnect, a mobile application that distributes interactive troubleshooting and repair information to hospital technicians and enables communication between technicians and clinical engineers across the globe. I had a wonderful experience visiting Rwanda and collaborating with two non-profit organizations to distribute the application in parts of Africa. The project resulted in a startup that is moving forward to improve access to safe and affordable surgical care across the globe.

My graduate experience presented numerous opportunities for technical and professional development through these high-impact projects. I am sincerely grateful to Tau Beta Pi and all those who supported me along the way to make this a reality. I aim to pursue medicine as a career and hope to bring my clinical practice and engineering together to advance healthcare in the future.

Ryan P. O'Hara, NY N '16
Nagel Fellow No. 19

Ryan is pursuing a Ph.D. in biomedical engineering at Johns Hopkins University (JHU). Last summer, he joined the computational cardiology lab directed by Dr. Trayanova. Her research group's novel simulation software, which uses patient-specific electromechanical heart models, has been demonstrated to improve risk stratification and clinical therapies for patients susceptible to cardiac arrhythmias following ischemia.

My research project focuses on improving treatment decisions for patients with hypertrophic cardiomyopathy, an often asymptomatic disease that is the most common cause of sudden cardiac death in the young. Current risk stratification methods fail to appropriately classify patients in this cohort, and the only approach for treatment is secondary prevention with an implantable cardioverter defibrillator. My project aims to develop a simulation protocol to predict the risk of sudden cardiac death from arrhythmia in these patients.

To supplement my research, I have taken interdisciplinary coursework through the JHU School of Medicine and Whiting School of Engineering. These courses have strengthened my engineering and biomedical knowledge necessary for advancement in my field of study. I am also a volunteer mentor at a Baltimore public high school through the P-TECH program, a STEM initiative geared towards adolescents who have a desire to work in the health care technology industry. As a mentor, I assist in skill and professional development, clinical shadowing, and job exploration through the entirety of the students' high school education.

My first year of graduate study as a ΤΒΠ Fellow has been truly rewarding and I look forward to the rest of my education and professional development at JHU as an NSF Graduate Research Fellow.

Katherine E. Riojas, OK B '16
Hanley Fellow No. 10

I am finishing my first year of the Ph.D. program in mechanical engineering at Vanderbilt University. My classes are centered around the design, control, and analysis of mechanical systems. At Vanderbilt, I have the amazing opportunity to be a part of the Vanderbilt Institute for Surgery in Engineering (VISE) where surgeons, engineers, and clinicians collaborate to develop innovative solutions for patients.

My research has been focused on the development of low-cost surgical solutions that improve patient outcomes for complex surgeries. These tools mimic the dexterity and user interface of current surgical robots in a fully mechanical system that can be constructed for less than $500. These devices will increase the accessibility of minimally invasive surgery, enabling it to be performed at practically any hospital in the world that can accommodate endoscopy equipment.

Next year, I will focus on passing my preliminary examinations for the Ph.D. program in advanced dynamics and controls. I will continue working on the development of medical devices to improve the accessibility of minimally invasive surgery. My classes will be concentrated on mechatronics and control, with a focus in cross-disciplinary collaborative design. I am very honored and thankful to have been selected as a ΤΒΠ Fellow.

Felipe Augusto Sozinho, WV B '16
Tau Beta Pi Fellow No. 814

During my time as a ΤΒΠ Fellow, I began my master's in electrical engineering at West Virginia University, with a focus in power systems. During my first semester I worked as a graduate student instructor, teaching two large classes of CS 101.

This experience was great as I had opportunity to plan and conduct the classes on my own, having great material support to use in the classes from the course department. I also had to deal with grading all the assignments and meeting with students. This led to a great development of my communications and interpersonal skills, as well as a better understanding of the work around being a professor. Furthermore, I also completed my core coursework.

For my second semester, a big change happened in my academic life. I changed my focus from power systems to communication, and started working as a graduate research assistant. This change made this semester a very challenging one but also exciting nonetheless.

Currently, I am working on a hardware implementation of a software code, with the objective of having a real-time analysis of the data captured by telescopes, that would only keep possible signals and discard most of the noisy data, diminishing storage requirements.

I would like to thank Tau Beta Pi for their support during my first year of graduate school, and I am grateful for all the doors that being a part of this organization have opened for me. I look forward to continuing my work, and possibly enrolling in a Ph.D. program after my master's degree.

Ever O. Velasquez

Lisa Wang

Shuwen Yue

Kasra Zarei

Ever O. Velasquez, FL H '16
Dodson Fellow No. 3

This past year as a ΤΒΠ Fellow, I began my Ph.D. in chemical engineering at UC Berkeley. During the first semester, the focus was on completing the program's core courses of thermodynamics, kinetics & reaction engineering, and transport phenomena. The purpose of these classes was to prepare for the oral preliminary examinations and have a strong fundamental background.

As well as classes, I assisted the introductory chemical engineering course at Berkeley as a graduate student instructor. My responsibilities were engaging student interest with individual course discussions, weekly feedback of assignments, and aiding with the course design project.

I began research with Dr. Jeffrey Long in the area of gas separations utilizing mixed matrix membranes. My project will be exploring the polymer-adsorbent interface and maximizing the mechanical properties of polymer membranes with the excellent adsorption properties of metal organic frameworks for post-combustion carbon capture. This project will require an interdisciplinary approach of chemistry, chemical engineering, and material science. This will give me a great background in multiple disciplines and further my fundamental background in theory and application.

My fellowship year has been a challenging, but amazing learning experience. I am grateful for the generous support of ΤΒΠ and excited to continue my research and give back to the field of engineering.

Lisa Wang, CA Γ '16
Forge Fellow No. 5

The ΤΒΠ fellowship has allowed me to pursue research in AI-assisted educational technologies under the guidance of Chris Piech while completing my coursework towards a master's degree in computer science at Stanford University.

One of the challenges in automated online learning environments is understanding what a student has learned while she is solving exercises. Being able to model a student's knowledge could help intelligent tutoring systems decide what feedback to give or what to teach next. Drawing upon ideas from natural language processing and learning sciences, we designed machine learning models to trace a student's knowledge while they are attempting a programming exercise.

Our models were able to predict a student's future success and grouped together students with similar learning patterns. I presented this work at the ACM conference "Learning at Scale" 2017 at MIT and the corresponding paper got accepted at the "Educational Data Mining" Conference 2017. Participating in Learning at Scale was a very valuable experience, as it allowed me to get feedback and learn from other researchers in this field. It was also very inspiring to see the excitement of this interdisciplinary community and the diversity of approaches to scaling education.

Aside from pursuing research, I am co-teaching a course on data science for students who are not majoring in computer science. Our goal is teach them the tools and techniques to analyze data, tell stories with data and avoid common pitfalls. Helping design this course has been incredibly fun and allowed me to experience education from the teacher's perspective.

I am very honored to be a ΤΒΠ fellow and would like to express my gratitude to for the generous support towards my studies.

Shuwen Yue, AL B '16
Tau Beta Pi Fellow No. 815

After graduating from the University of Alabama, I began a Ph.D. program in the chemical and biological engineering department at Princeton University. My first year has been enriched with coursework expanding my knowledge and understanding in thermodynamics, kinetics, fluid mechanics, transport phenomena, and numerical algorithms.

I have also started research in the lab of Professor Athanassios Panagiotopoulos where I am working to develop robust and transferable water models optimized for thermodynamic properties of pure water and aqueous solutions of electrolytes, with applications relevant for atomistic simulations of mixtures in carbon sequestration and energy generation. The goal of this project is to build a hybrid model that combines the computational efficiency of empirically derived classical water models with the high degree of accuracy of ab initio water models.

In this process, I am studying methods in Monte Carlo and molecular dynamics, as well as quantum level ab initio calculations, for force field development of these novel models. My hope is to optimize models that can allow for much more accurate simulations of mixture phenomena that are essential in carbon sequestration and separations technology.

I am very grateful for Tau Beta Pi for their support and generosity, and I am excited to continue my research and pay-it-forward throughout my career.

Kasra Zarei, IA B '16
Matthews Fellow No. 19

During the past year as a ΤΒΠ fellow, I completed my master's degree in biomedical engineering at the University of Iowa. I devoted the year to academic coursework and research. My research interests have centered on the use of quantitative image processing, digital signal processing, and smartphone application development.

Among other accomplishments, I successfully defended my master's thesis titled "Objective Quantification of Sensory Function Using a Battery of Smartphone Applications." My thesis describes the extensive work I put into engineering a suite of smartphone applications that provide comprehensive testing of vision and hearing function (beyond the traditional measures acquired using an eye chart or pure tone audiometry test). In unrivaled detail, I also describe the necessary calibration and technical validation, as well as the preliminary clinical validation I performed through testing my products on a small cohort of human subjects.

My work will be used long-term for at-home independent testing, with collaborations already initiated, which provides a lot of value to clinicians and researchers alike. I presented an oral presentation at SPIE Medical Imaging and will also be presenting my work at the 2017 Association for Research in Vision and Ophthalmology (ARVO) annual meeting. I also published two first author papers this past academic year, with a couple other manuscripts in the works.

This year has also been unique in that I have matured as a writer. I have numerous writing projects in the works, including encouraging engineers to write about science in ΤΒΠ publications. I am thrilled to announce that I will be extending my studies at the UIowa, pursuing the combined MD/Ph.D. program. My graduate studies will focus on the intersection of bioengineering, neuroscience, and Ophthalmology. I am extremely thankful for the support of my mentors, family, friends, and Tau Beta Pi towards my future academic goals. I am the product of the many positive influences in my life.