# 2004 Fellow Reports

*Reports of the 2003-04 winners in Tau Beta Pi's 70th Fellowship Program are presented here. They constitute the Fellows' only specific obligation to the Association after their appointment by the Fellowship Board. Their reports were written in April, and the verb tenses may sound wrong when read in midsummer. Each of the winners expresses appreciation to advisors and major 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.*

*Of the 35 fellowships awarded a year ago, 16 of the students have been paid cash stipends totaling $158,000. The others did not need the stipend.*

## Eric J. Clopper, GA Α '03
## Centennial Fellow No. 18

I am completing a master's degree in electrical and computer engineering and a minor in management at the Georgia Institute of Technology. I have secured a mastery of telecommunications theory as well as an improved understanding of fiber optics and computer architecture. I have gained practical knowledge through laboratory experimentation with information security and network routing and have continued to grow as a leader through student government and several advisory boards. I was elected student government senator of the year and was given the institute's award for servant leadership. The college of engineering recognized these achievements through the 2004 ΤΒΠ Engineering Cup for best academic excellence, leadership, and service to the institute.

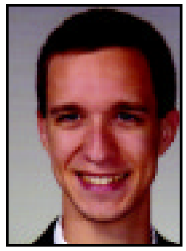
The Centennial Fellowship has allowed me to excel in these areas through its support because ΤΒΠ relieved the financial burden of education. After graduation I will begin my career at the United States Department of Defense in Arlington, VA. I will help advance network modeling and simulation in order to improve defense information flow and the safety of our soldiers who rely on it. My experiences in graduate school and the funding that granted me the freedom to explore have prepared me to succeed.

## Rory W. McDonald, FL Γ '03
## Fife Fellow No. 57

My wife Anne was pregnant with our first child and finishing a degree in business. I was starting graduate work in geotechnical engineering at the University of South Florida. With student loans and only my research stipend supporting us, we weren't sure how we would make it. At that moment, we received word that I had been named a ΤΒΠ Fellow and would receive generous aid.

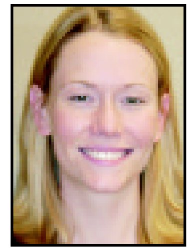
I was free to concentrate on coursework and research leading to an M.S.C.E. with honors. I headed a project on recycled materials. Although extensive research had been conducted to investigate the use of these materials in geotechnical and highway systems, the dissemination of the findings was often limited. The problem was compounded by the lack of a single resource containing relevant engineering and environmental characteristics of each material and by the wide discrepancies among local and state environmental regulations. A relational database was designed to serve as a compendium of recycled material research—containing information on applications, processes, availability, cost, and engineering properties. It is a tool for engineers to implement academic research in practice. Results of the project are under review to be published as part of a geotechnical special publication this year.

I became interested in the business side of engineering and will pursue an M.B.A. at Stanford this fall. My plans include working for a multi-national geotechnical engineering firm and eventually starting my own company. I hope to encourage and support academic opportunities for future engineers in my community.



E.J. Clopper

R.W. McDonald



J.S. Miller

## Jennifer S. Miller, OR Γ '03
## Fife Fellow No. 58

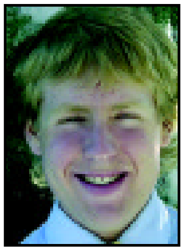
I completed my first year of graduate study in computer engineering at Duke University as a Fife Fellow. While most of my time was spent completing a majority of the coursework required to earn my master's degree next year, I also had the opportunity to serve as a teaching assistant for an introductory digital logic laboratory.

Throughout the year I worked on several projects that were both interesting and relevant to my research interests. For example, I began developing compiler support for a nanoarchitecture that is currently under development here. I also worked on dynamically verifying the correctness of a cache coherence protocol that was developed at the University of Wisconsin last summer, token coherence. These projects were applicable to courses I took on nanocomputing and parallel computer architectures, respectively.

Next year I intend to continue my education and research in computer architecture here under anNSF fellowship . Upon graduation, I would like to find a position in industry where I can work on some aspect of microprocessor design. I thank ΤΒΠ!

## Eric L. Pollard, SD Α '03, E.I.
## Fife Fellow No. 59

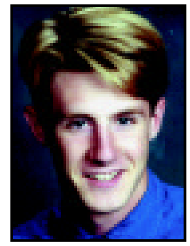
After spring 2003 graduation with a B.S.M.E. from South Dakota School of Mines and Technology, I was fortunate to be offered a space scholar position at the Air Force Research Laboratory. The scope of my work at the space vehicle directorate focused on characterizing the non-linear dynamic behavior of membrane optics. The ΤΒΠ Fellowship has enabled me to devote my efforts outside classes to research on two parallel topics, finite-element analysis of shape-memory alloy-actuator martensite twin reorientation for deployment of space-based membrane optics and laser-deposition of nickel-titanium shape-memory alloys. I hope to re-join the directorate this summer to cross-pollinate complimentary studies performed throughout the year and address issues associated with analysis of the optical-level mechanical behavior of large-


E.L. Pollard, E.I.


S.G. Smith


D.A. Jaye


Y.-H. "Judy" Hsu


D.J. Palecek


J.L. Morse

aperture membrane optics. I anticipate completing my degree this fall and building a career in government or industry to continue tackling the challenges of next-generation space technology.

## Steven G. Smith, SD Α '03
## Fife Fellow No. 60

My first year at graduate school has consisted mainly of coursework to pursue a computer-science graduate degree. I am taking classes that are geared toward a specialization in software theory. Some of the more interesting classes include cryptography, artificial intelligence, and database implementation. I look forward to finding a summer job to help me focus on an area that I would like to research. In terms of my career plans, I would like to work in the industry for a few years at least and then perhaps move to academia to become a professor. I am very thankful for ΤΒΠ's assistance in funding my education at Stanford University.

## Deborah A. Jaye, WI Β '03
## Spencer Fellow No. 48

This spring I began my first semester of full-time graduate studies in biomedical engineering at Marquette University. During the break last December, I returned to work with the heart-failure research group at Medtronic, Inc., in Minneapolis where I had previously completed two internships. The brief work term was fruitful for both parties. I assisted the group in meeting a deadline for a submission to the FDA by analyzing data on the safety and efficacy of a new stimulation therapy for heart failure. I was also able to clearly define my graduate-research project, which will be done in collaboration with the firm. Receipt of the Spencer Fellowship helped to facilitate this arrangement.

My research characterizing some of the mechanisms of this new therapy is continuing this summer at the company. Because I am in the five-year B.S./M.S. program, I anticipate completing my research and graduating this fall. I was previously undecided on whether I would pursue a Ph.D., but recent good fortune has provided me with a great deal of motivation. The award of an NSF fellowship has inspired me to research other universities with well-known cardiovascular research centers where I can begin doctoral studies in the spring. I am very grateful for receiving the Spencer Fellowship and am proud to be a member and Fellow of ΤΒΠ.

## Yung-Hsiang "Judy" Hsu, CA Ω '03
## King Fellow No. 42

I am in my first year in the dynamic design lab of the mechanical engineering department at Stanford University. I have concentrated on nonlinear analysis and control, embedded systems design using microprocessors to design and implement autonomous vehicles, and vehicle dynamics. These courses have provided the background needed for my ongoing research project: designing the force feedback system in a steer-by-wire '97 Corvette. The unique sensing capabilities, coupled with GPS and nonlinear robust feedback linearization techniques, provide an exciting opportunity to enhance the safety of vehicles by compensating for unstable dynamics near handling limits. We perform vehicle testing at Moffett Field at the NASA Ames Research Center.

Supporting women in the sciences has been my long-term goal. I intend to continue efforts to encourage young women to pursue careers in engineering. This summer, I plan to be an assistant instructor for the Sally Ride Science Camp, where middle-school girls attend interactive workshops on astronomy, mechanical engineering, and oceanography. I look forward to assisting the development of the curriculum and creating classes to introduce students to how cool science can be. In my free time, I have found a passion in following Cardinal basketball, hustling regulars at local bars in pool, enjoying sunny weather, and exploring night life in San Francisco.

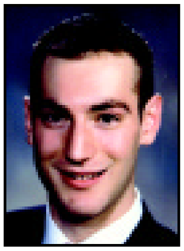
## Daniel J. Palecek, SD Α '03
## Sigma Tau Fellow No. 30

My first year of graduate study at my alma mater, the South Dakota School of Mines and Technology, has focused on research and coursework. After graduation in May 2003, I spent the summer working in a research position on campus at the laboratory of applied electromagnetics and communication. Throughout the year I have continued research, mostly in the area of electromagnetics. In particular, I have worked on the design and modeling of various antenna types. My coursework has included antenna theory and computational electromagnetics. Knowledge and skills gained have helped me considerably in my research. I have begun my thesis research, which deals with designing wideband antennas using resistive tapering. Newly acquired manufacturing equipment has opened exciting possibilities in this area, and I look forward to exploring them. I plan to graduate in May 2005 and move to an industrial position in the area of antenna design. I thank ΤΒΠ.

## Jonathan L. Morse, NE Α '03
## Stark Fellow No. 26

This past academic year I have been learning the fundamentals of ultrasonic medical imaging. Under the guidance of Dr. Greg Bashford of the department of biological systems engineering at the University of Nebraska-Lincoln, I have worked toward my master's degree in biomedical engineering. The project under my care relates to improving breast ultrasound imaging so that asymptomatic patients can avoid the ionizing X-ray mammography currently in use. Combining our lab's commercial ultrasound machine with custom designed rotating and translating stages, reproducible images can be taken and saved to a computer for analysis. The novelty of our research lies in this analysis. By taking multiple ultrasound scans of the same structure and combining those images in a non-linear fashion, the effective resolution can be improved by removing some of the inherent "speckle" caused by acoustic interference in the body.

This rewarding year has provided a framework for what I hope to achieve this summer and next year. If research works well, I plan to pursue a Ph.D. in either biomedical or mechanical engineering. My interests in small arms and non-lethal weapons could lead to a career with the government or police forces. As hundreds of Tau Bates before me have shown, there is no limit to what we can do when we put our minds to something, and I hope to join the list of professionally successful ΤΒΠ alumni in the coming years.



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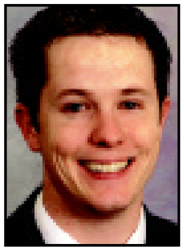
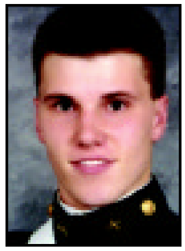


J.E. Greer, E.I.



J.C. Tobias, E.I.

P.E. McGovern, E.I.

D. Plante

S.K. Michael

## Zachary M. Thomas, NY Β '03
## Williams Fellow No. 24

I am pleased to report that my first year has been a tremendous success. While the change from undergraduate to graduate life has been substantial, MIT has given me all the resources I've needed to burgeon in the new environment. Not having a specific arrangement at first, I took a period of time to explore many of the research groups doing work related to my area of interest—electromagnetism. I joined Prof. Jin Kong's center for electromagnetic theory and applications group after a month of careful consideration. My first research project focused on the possibility of applying space-time adaptive processing techniques to practical space-borne radar geometries. I've been working on a second project dealing with peculiar, yet purposeful, array geometries for patch antennas.

In addition to my academic and research interests, this environment has fostered growth of my spiritual, social, and cultural ideas and understandings. The diverse community of Boston has served as the perfect landscape for this growth. One of the unexpected opportunities has been my participation in an experimental graduate counseling seminar organized by Professor Alan Oppenheim. The group of incoming graduate students has discussed graduate life, met with distinguished members of the campus community, and uncovered areas of common interest.

As I look to the future and what goals I should set for myself, I just reaffirm my commitment in seeking a Ph.D. Beyond this landmark only speculation is possible. I must continue to be alert to opportunity and seize it when it arrives.

## James E. Greer, UT Β '03, E.I.
## Deuchler Fellow No. 24

I am working as a full-time research associate with the environmental engineering laboratory at Brigham Young University and have completed half of my coursework for a master's in civil and environmental engineering. I hope to complete the rest of my courses emphasizing hydrology and geology in August 2005. I have begun my research on an improved mesh-generation algorithm. The design has been completed, and I am working to implement the code. I am also doing literary research on other mesh-generation algorithms. My goal is to complete the coding of the algorithm and begin preparing my thesis by August. I am enjoying my time here and am thankful for the recognition and the help that ΤΒΠ has provided.

## Justin C. Tobias SC Γ '03, E.I.
## Maddox Fellow No. 8

I found the opportunities and the expertise at MIT both exciting and rewarding from an educational perspective. I have pursued the study of construction engineering and management within the civil and environmental engineering department with courses in project management, project delivery methods, project finance, managerial accounting, globalization, and strategic management. I have been active in the classroom as a teaching assistant during the first two semesters. My research focus has centered on the development of sustainable urban transportation systems in developing countries examining the challenges to growth and the evolving possibilities for confronting them. In addition, I am active in the jiu-jitsu club and in a variety of intramural sports, which recently led to my selection as the athletic officer for my graduate student residence hall. Upon completion of the master's program, I plan to work in the construction industry, specifically in the management of institutional and biomedical buildings. I thank ΤΒΠ for its support in the achievement of my educational and professional goals.

## Paul E. McGovern, IN Δ '03, E.I.
## Matthews Fellow No. 6

This year, with the help of the ΤΒΠ Fellowship, I have acquired skills at the University of Illinois at Urbana-Champaign that are essential to both my current engineering position and my long term career aspirations. While working as a software engineer for Delphi Delco Electronics, I was involved in the development of automobile warning systems. These warning systems typically involve the use of radar or ultrasonic sensors to detect the presence of a hazardous obstacle in the path of the driver, and an audible alarm to alert the driver of the impending collision. The knowledge of digital signal processing and integrated circuits that I have gained through my graduate studies has granted me a deeper, more perspicuous understanding of the theory behind my work and the methods used to produce the end product. Noise shaping techniques and efficient filtering algorithms are particularly vital to certain system operations. As a result of my newfound expertise, I will now be better equipped in the future to take on a more challenging role within the organization. My long term career goal is to become an engineering manager within the automotive technology industry. By advancing within the automotive industry, I will be doing my best to ensure that automobiles operate at optimal safety levels. Effective technology management requires both a genuine understanding of the intricacies of the technology as well as the economic climate of the industry. My graduate studies have helped make me more proficient in both of those areas.

## Donnamary Plante, NY Ι '03
## Nagel Fellow No. 6

I thank ΤΒΠ for its support in helping me complete my M.S. in civil engineering. Knowing I would have the support of my advisor and mentor, Dr. Vito Guido, I decided to continue my studies at the Cooper Union for the Advancement of Science and Art.

I have been taking courses in both my major, geotechnical engineering, and my minor, environmental engineering. With my background in secondary education, I decided to develop the curriculum for a new undergraduate course in construction materials as my thesis project. This has proven to be both educational and rewarding. I am able to apply many of the skills I developed in my years of working as an educator and put them to good use. I derive a deep level of satisfaction from creating instructional materials that will be used by the school and future generations of students.

This past semester, I was selected to teach one of the soil mechanics laboratory sections. I enjoyed getting to know my students and sharing my experiences with them. I was offered a full-time job at the internship I had as a student and will work as a civil engineer for the town of North Hempstead in Long Island, NY.

## Sadie K. Michael, MD Β '03
## Astronaut Fellow No. 5

It has been a busy year. After receiving my B.S. in aerospace engineering in May 2003 from the University of Maryland, I immediately started coursework and research for my master's degree. Since last June, I have taken courses in mathematics, reliability engineering, risk management, robotics, spacecraft design, and composite materials.

Through my studies, I developed a research topic stemming from my passion for the space program. Following the Columbia tragedy, I wanted to contribute to the return-to-flight efforts of NASA, so for my thesis I designed an on-orbit inspection system for the space shuttle. I have presented my design at several conferences and won a regional student competition that resulted in a trip to present at an international conference in May. I also submitted a paper on my design concept to NASA in hopes of helping further the return-to-flight efforts. In July, I will defend my thesis to complete my M.S. in aerospace engineering. In addition to my studies, I have been planning my wedding in September. After graduation, I plan to start my career in space-systems design and manufacturing.

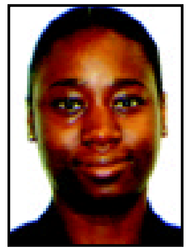
I thank ΤΒΠ for the honor of being named a Fellow in memory of Rick D. Husband and his crew who were lost on the space shuttle *Columbia* inFebruary 2003. I also thank my future husband for his encouragement and support, including his insistence that I apply to the ΤΒΠ Fellowship Program.

## Omolabake A. Adenle, MD Ε '03
## Tau Beta Pi Fellow No. 685

The first year of my doctorate in information engineering has been an intense journey packed with the prerequisite coursework and departmental seminars, all the while developing ideas for my research in blind de-convolution and rank-deficient/ill-posed problems. Apart from my primary efforts for my theses, I have also had the opportunity to pursue various projects in biomedical imaging, including the development of an algorithm for determining white-matter fiber tracts using a type of imaging modality called diffusion-sensor MRI, as well as identification of cancerous nodules in chest CT, concurrently with my main research. I will also be taking part in the IEEE summer school in biomedical imaging taking place in Berder, France, where I will attend seminars and presentations on developments at the forefront of research. During the remainder of my Ph.D., I intend to develop blind de-convolution algorithms in application to various imaging modalities and also pursue incorporating particle filters into the framework for solving ill-posed problems. After completing my studies, I hope to work in industry, pursuing commercial application of statistical signal-processing techniques and eventually set up my own company providing biomedical-imaging services.

## Elizabeth A. Basha, CA Φ '03
## Tau Beta Pi Fellow No. 686

This past year was filled with many exciting and fun-filled experiences. During the first semester, I was a teaching assistant for a beginning digital design course helping sophomores and juniors learn valuable computer-architecture skills. Second semester, I began working on a research project involving atomicity of memory accesses in shared-memory multiprocessors. Additionally, I traveled to Honduras as part of a MIT service-learning project exploring how technology can help people in developing communities. This led to a project developing an early-warning system for flooding in Honduras that will be completed this summer, and an opportunity to participate in a conference on early-warning systems in Guatemala. I plan on continuing both projects, maintaining a focus on both computer architecture and development work, in the future as I gain my master's and doctorate in electrical engineering. Eventually, I hope to work in a research lab.



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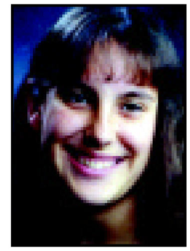


E.A. Basha

P. Batoni

## Paolo Batoni, NC Δ '03
## Tau Beta Pi Fellow No. 687

After completing my university honors thesis, *Digital Tarot*, and my B.S. degree in computer engineering (*summa cum laude*) with a concentration in microelectronics, I remained at my alma mater to pursue my M.S.E.E. with a concentration in materials and devices. During my first year of studies I have been able to learn more about VLSI and ULSI processing, integrated photonics, thin-film devices, and wide-bandgap materials while working as a research assistant in the electrical and computer department.

Under the supervision of Dr. Ed Stokes, I have been investigating the photoelectric properties of III-nitride materials and devices in order to create infrared pumped LED devices with enhanced performance for spectroscopic applications. I will continue my research as an intern at the micro and nano structures technologies laboratory of the GE global research lab in Nyskayuna, NY, during the summer, and at the end of July I will be presenting the results of our LED group's research at the IWN 2004 International Workshop on Nitride Semiconductors in Pittsburgh, PA.

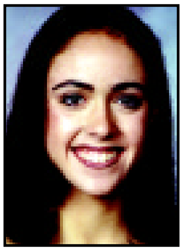
On my own path to truth, I have become very aware of the fact that "no man is an island," and this is the reason that I have always participated in several different activities within the college of engineering—Phi Kappa Phi, ΤΒΠ, and the Resident Learning Society. I voluntarily tutor fellow students in several engineering disciplines and serve as a president for the local chapter of IEEE.

## Stephanie J. Culler, CA Ψ '03
## Tau Beta Pi Fellow No. 688

In September I started the Ph.D. program in chemical engineering at the California Institute of Technology. The coursework for the first two terms was quite challenging, but also enjoyable. I have recently started my thesis project involving targeted-gene expression. The long-term goal of my project is to develop technologies and design-strategies for RNA molecules such that we can control and predict how molecules will be alternatively spliced. I chose this project specifically because this technology will have applications in therapies and treatments that can be directed to diseased or affected organs, cell types or tissues, cancer treatments, and gene-therapy treatments. In the future I hope to be involved with this technology on a large-scale level working with a pharmaceutical company that can provide these treatments to millions of people. In the meantime I have been continuing my violin studies and will audition soon for the Caltech-Occidental Chamber Orchestra. In the next few years I also would like to become a professional violin player, however more as a hobby than a career. I am excited about what the future holds in terms of my career in chemical engineering and my work with ΤΒΠ here, but also at the community level.

## Margaret M. Darrow, AK Α '02
## Tau Beta Pi Fellow No. 689

My graduate work investigates the mechanisms of frost heaving. Over this past fellowship year, aside from taking classes, I have been setting up a frost-heave testing laboratory at the University of Alaska Fairbanks. During July 2003, I traveled to various loca-



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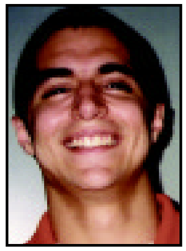
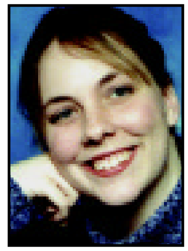
M.M. Darrow



B.C. DiPaolo



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Y. Hilewitz

tions in Alaska that have demonstrated frost heaving problems associated with roadway embankments. I sampled soil at these locations to use in controlled laboratory frost-heave experiments.

Last fall I traveled to Hokkaido University in Japan, which has a cooperative research agreement with UAF. Faculty there have produced a state-of-the-art frost-heave test cell, and I learned the test procedure and observed how to set up the equipment. Since my return, I have concentrated on setting up our equipment, including a state-of-the-art frost-heave test cell made by our colleagues in Japan. Working the bugs out of the system has taken time; however, I produced a successful test this March. Many tests will follow, as I investigate the role of unfrozen water in frost heaving. I plan to complete my Ph.D. degree by May 2006 and hope to apply what I have learned to roadway and foundation design. My long-term goal is to obtain a teaching/research position at a university.

### Brian C. DiPaolo, PA Ζ '03
### Tau Beta Pi Fellow No. 690

Who would have thought humans could manipulate human tissue using cellular-level processes? The reverse engineering of perhaps the most complex of systems, the cell, has profound implications on the way we treat ailments and pursue technology. One may think such investigations are the sci-fi writings of Asimov or Kevin Kelly, but it's part of a PENN bioengineer's daily job. I began last fall investigating the mechanical stretch properties of lung tissue. Lung cells form an enormously complex network of air tubes, air sacs, and blood vessels that allow the exchange of waste carbon dioxide for oxygen. Each cell has a molecular skeleton that designates shape and mechanical properties. Using molecular fluorescent markers specific to cytoskeletal elements, I have analyzed the changes that occur in a skeleton during high-lung-stretch magnitudes typically found in pathological conditions. Subsequent work will involve molecular treatment in an attempt to subvert the cytoskeletal changes and perhaps the pathological state of a patient.

Upon completion, I hope to lend my expertise to the advancement of science using space technology as an astronaut for NASA. Orbiting stations will provide a wealth of knowledge in the areas of tissue growth and engineering, immunological systems, and materials engineering. Thank you, and good luck to all those who practice sound and creative engineering.

### Danielle N. Drury, GA Β '03
### Tau Beta Pi Fellow No. 691

The past year has been a wonderful beginning to my pursuit of a Ph.D. in bioengineering at the Georgia Institute of Technology. I have begun a program that includes classes in the life sciences, mechanical and polymer engineering, mathematics, and classes that integrate all three areas. Those that I have attended have delved into cellular engineering, biomaterials, biochemistry, and polymer science. After a brief time working with smooth muscle cells in the lab of Zorina Galis, Ph.D., my thesis project and advisors have been chosen. I will be working under Larry V. McIntire, Ph.D. (bioengineering) and Marie Csete, M.D., Ph.D. (Emory University anesthesiology) in an investigation into roles of oxygen tension and mechanical forces in the differentiation of smooth muscle from bone-marrow progenitor cells. Such cells might be used to seed a tissue-engineered vascular graft. This project is closely tied to my primary interest, which is tissue engineering in cardiovascular applications, and provides a significant opportunity for collaboration with other labs. I hope to find work in research and design for a medical-devices company with an interest in tissue engineering.

### Anna R. Gilbert, IN Α '03
### Tau Beta Pi Fellow No. 692

Since being selected as a ΤΒΠ Fellow, I have been working towards my M.S.M.E. at Purdue University. My specialization is in applied materials and solid mechanics. The research project I am working on involves improving the effectiveness of high temperature thermal barrier coatings (TBCs), which are used in such applications as diesel engines, gas-turbine engines and aircraft engines. The TBC, typically yittria stabilized zirconia, is bonded to a metal substrate enabling a significant increase in the thermal load capabilities for the specific application. However, the interface of the coating and metallic substrate has a mismatch of properties which when subjected to a thermal gradient causes spallation of the coating.

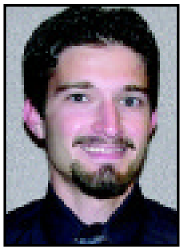
My research has involved decreasing crack propagation induced through thermal shock by exploring monolithic ceramic-ceramic composites. The goal is to demonstrate that this new configuration is able to reduce crack formation and eventual delamination, which will increase the life of the final application. This is being performed through both experiments and analytical modeling. After receiving my master's degree, I plan to work in either a research facility or as a project manager in a manufacturing environment.

### Yedidya Hilewitz, NY Ι '03
### Tau Beta Pi Fellow No. 693

During my first year as a graduate student, I have selected my research advisor and joined Princeton's architecture laboratory for multimedia and security, in addition to passing my written Ph.D. general exam. My initial research has focused on fast implementations of bit-oriented operations such as rotate, shift, mix, group, and permute, as these play a significant role in cryptographic ciphers. Additionally, our group has started researching the necessary elements for a robust secure computing core that would provide immunity to the "malware" rampant today. I will likely continue focusing on secure architecture with the general goal of realizing security without compromising performance. After receiving my doctorate, I intend on transitioning to industry and on continuing researching high-performance computer architecture.

### Steven G. Kuntz, CA Ψ '03
### Tau Beta Pi Fellow No. 694

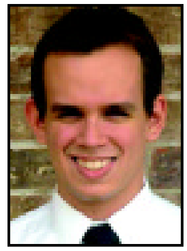
I have completed my first year as a Ph.D. graduate student at the California Institute of Technology in biochemistry and molecular biophysics. I have worked on different research projects as part of my rotations and will choose a lab for the bulk of my research. My first project, performed in a developmental imaging laboratory, revolved around establishing techniques for the study of single-cell isolation and analysis in mouse olfactory epithelium to understand



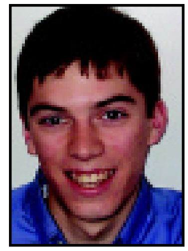
S.G. Kuntz

A. Kutlu

C.H. Lim



C.D. Meek



T.L. Morse

B.D. Olsen

the driving forces behind expression of unique odorant receptor proteins. My second project, in a biochemistry laboratory strongly rooted in physical chemistry, was to establish parameters for DIP-pen nanolithography, using an atomic-force microscopy tip, that are optimal for printing biotin compounds on silanized-glass substrates, which in the future will be useful in protein network patterning to develop enzymatic circuits. I am doing research in a muscle development laboratory and contributing to a project using bioinformatic genomic tools to isolate putative enhancer elements involved in protein expression critical for embryotic vertebrate development. My hope following completion of my Ph.D. is to perform further research as a postdoctoral scholar and eventually a professor.

## Arda Kutlu, TX Δ '03
## Tau Beta Pi Fellow No. 695

Being a part of the Northwestern University industrial engineering community has been a great experience so far. Our department is involved in many current research projects and provides a great environment for graduate students. We can learn about departmental active research topics during weekly seminars and follow the ongoing research at different schools via our seminar series with speakers from other universities. I also find the collaboration among departments and schools here useful. I took classes from both civil engineering and Kellogg, which improved my background in transportation, logistics, and supply chain.

I am also doing an independent study with a Kellogg faculty member in dynamic power control. I find this study useful because it gives me a flavor of what I will be doing for my dissertation research. I have not decided on a topic yet but production, logistics/supply chain, and simulation are the areas that I like most so far.

I try to continue my active student life and was recently selected as the social events coordinator for the Turkish Student Association, which promotes Turkish culture among all the students.

Selecting my research topics and having a solid research background are my short-term goals for the following years. In the long run, I want to become a faculty member at a college in the U.S.

## Chyi Hwang Lim, AZ Β '02
## Tau Beta Pi Fellow No. 696

As a ΤΒΠ Fellow, I have focused my full attention to the investigation of high-strain-rate material behavior in nickel aluminum (NiAl)—in collaboration with Los Alamos National Laboratory. The fall was spent on literature research of previous work. Training courses on lab equipment were taken concurrently to prepare me for the actual research. One of the most important tools is the orientation imaging microscopy system of the environmental scanning electron microscope. This system allows lattice orientation mapping and is used to characterize pre-shocked and post-shocked NiAl samples.

The spring was spent gathering experimental orientation maps and developing models to simulate deformation on samples because of loading. A preliminary proportional double-slip model was used to estimate the plastic deformation, followed by a more intensive incremental single-crystal plasticity model to capture the entire plastic behavior of the deformation process. Work on this latter model is still underway and will be implemented on a commercial finite-element package after it is completed.

I am satisfied with the work done thus far and hope to submit my first paper for publication shortly. I will venture into industry after completion of my M.S. degree to gain work experience before returning to school for a Ph.D. if the opportunity arises.

## Chance D. Meek, OK Γ '03
## Tau Beta Pi Fellow No. 697

I am pursuing my M.S.M.E. at the University of Texas in Austin in the area of dynamic systems and controls. I am doing research at our applied research laboratories on a project funded by the Office of Naval Research. The summer after graduating from Oklahoma State University, I worked as an engineering intern at Norris Rods, Inc., a manufacturing company for oil equipment. There, I researched the costs and benefits of obtaining new machinery and designed new plant layouts to make the factories more ergonomic. The experience was valuable, as I had the opportunity to work on problems addressing people and resource issues of engineering.

My thesis project will be based on my work at the laboratories, focusing on the reconfiguration of power systems for naval electric ships. The power system can be modeled as a grid of circuit elements regulated by on/off switches. The goal of the research project is to find suitable methods for determining the set of switch configurations that minimizes power loss of the electric ship.

## Timothy L. Morse, NY Ι '03
## Tau Beta Pi Fellow No. 698

For the past year, I have been enrolled as a graduate student in the Sibley School of Mechanical Engineering at Cornell University. I have been studying fluid mechanics and conducting research on the subject of vortex-induced vibrations under the guidance of Prof. Charles Williamson. Vibrations of a structure can develop due to the flow of a fluid past an object, generally if the frequency with which vortices are generated in the wake is close to the natural frequency of the structure. The periodic formation of vortices causes an unsteady pressure distribution around the body, which interestingly causes much higher fluctuating forces transverse to the flow direction than parallel to the flow. These forces affect the dynamics of the structure and may lead to fatigue and failure.

In order to understand the vortex-induced vibrations phenomena, we have been conducting experiments in which the motion of the structure is controlled. This simplifies the fluid-structure interaction and allows the wake dynamics to be examined for a well-defined motion. We have shown that results from controlled oscillation experiments can effectively predict the forces for the case when the structure is free to move. This is a first step to examining more aspects of the vortex-induced vibration phenomena through controlled oscillations. I plan to receive my Ph.D., and I am considering a career as a professor at a research university.

## Bradley D. Olsen, MA Β '03
## Tau Beta Pi Fellow No. 699

My year as a Fellow was successful and challenging. I am studying chemical engineering at UC, Berkeley, where I spent the first

J.N. Reck

S. Singh

N. Trivisvavet

semester completing graduate coursework. I joined the group of Dr. Rachel Segalman, doing research in the area of semiconducting polymers for application in solar cells or polymer LEDs. Making these high-efficiency devices requires controlling the morphology of the material. My project focuses on understanding how molecular engineering can be used to control the structure and phase behavior of semiconducting polymers and block copolymers.

I have been busy helping to build our new lab and starting research. I helped design equipment such as a vacuum line for air-sensitive chemistry and an adsorption system for solvent purification; these have been exciting lab-scale engineering projects. I have begun to synthesize and characterize the structure of the polymers. I am learning about and applying several chemistries to control the molecular structure of the polymers and am using atomic-force microscopy to examine self-assembly in thin films of polymer blends and block copolymers. After completing my doctorate, I hope to continue my career in polymer research. I would like to direct a program or lab where I can apply the skills gained through graduate studies to developing new technologies that benefit society.

## James N. Reck, MO Β '03
## Tau Beta Pi Fellow No. 700

Aside from the typical expectations of tough coursework coupled with challenging research, I was given the opportunity to participate as a summer intern at Sandia National Laboratories in Livermore, CA. At the completion of my internship, I found myself reluctantly going back to UMR, where I was asked by my advisor to assist in the teaching of a physical metallurgy laboratory, which has subsequently led to my being asked to teach the same course on my own during the upcoming fall 2004 semester.

The research that I am helping to conduct concerns the replication of metallic micro-components (structures with critical dimensions less than 1 mm) using a new processing technique known as friction stir processing. In the past year I have been able to secure most of the materials and equipment that are required to conduct the research, and have run several successful experiments. In addition, I have been given the opportunity to connect with other departments on campus in order to build a new machine that will help our group to better understand the materials and processes we are working with. I will most likely continue work toward a Ph.D. in metallurgical engineering and then work either at a national laboratory and conduct interesting research or in academia.

## Swatee Singh, NJ Γ '03
## Tau Beta Pi Fellow No. 701

For women in the U.S., breast cancer is the second-most deadly type of cancer. To aid mammographers, research has been directed towards developing computer-aided detection (CAD) tools. This past year, I have been working with my advisor's team to build a CAD system for improved mass detection in mammograms. In any CAD system the first stage uses some type of initial linear processing to detect a set of potential masses. The second stage consists of classifying these potential masses using predictive modeling techniques to reject false positives. Our goal is to develop a multi-layer system in which the first layer of the classifier will use a novel sub-region "hotelling" observer, that will be sensitive to changes in high frequency noise power spectra and structured noise. The second layer of the classifier will combine the observers to reach a decision variable that will decide if a region should be classified as a mass.

After completing my Ph.D. in biomedical engineering at Duke University, I wish to contribute to science by continuing research in the early detection of cancer and serve cancer patients by pursuing a career in radiation oncology. I am grateful to ΤΒΠ for the honor of being a Fellow—making it possible for me to contribute to society in a meaningful way by pursuing cutting-edge research.

## Nattavut Trivisvavet, RI Α '03
## Tau Beta Pi Fellow No. 702

Being a first-year graduate student in the department of management science and engineering at Stanford University has been a wonderful and exciting experience. I am enjoying the challenges of the academic rigor as well as the process of sorting out what direction I would like to take for my future Ph.D. research. I am inclined to explore the area of stochastic simulation methods in finance and derivative pricing. I look forward to joining a research group in the next couple of quarters to begin further in-depth research. In addition to taking graduate-level classes, I have been actively involved in the Thai-American Intercultural Society, whose primary objective is to promote Thai culture and create a mutual understanding of diversity in the local community. I have enjoyed myself here. Moving from the East to the West Coast was a big change, but the overall experience was exciting.

## Vernella V.V. Vickerman, DC Α '03
## Tau Beta Pi Fellow No. 703

My first two semesters at MIT have been fulfilling as well as challenging. I have taken several chemical engineering courses that have

helped to strengthen what I learned as an undergraduate at Howard University. Along with my coursework, I have also been involved with a volunteer group as a mentor for iMATH, a tutoring program for youth struggling in science and mathematics. I have also spent a good deal of time attending seminars on various research areas that have increased my knowledge of exciting and cutting edge technologies. My graduate research project will involve angiogenesis studies in a micro-fluidics reactor.

MIT offers many opportunities for me. I am on the path toward achieving my goals for my career in academia. I plan to do everything in my power to keep my conduct honorable as I commit myself toward excellence in my field. Thank you for the honor of being a ΤΒΠ Fellow.

## Y.K. Mark Wan, CA Α '03, E.I.
## Tau Beta Pi Fellow No. 704

I have been pursuing an M.S. in structural engineering, mechanics, and materials at the University of California, Berkeley. As part of this

one-year program, I have undertaken research on single-plate shear connections with reknowned steel expert Prof. Abolhassan Astaneh. Our goal is to determine the behavior of such connections under combined shear and tension forces using sophisticated finite-element analysis. Single-plate shear connections can be found on every steel building, and they are designed to resist shear forces from gravity loads. However, these beam-to-column connections can experience significant axial load if the supporting column fails during an extreme event such as an earthquake or blast. My research will aid structural engineers in designing steel buildings for extreme events. After graduation, I will return to Singapore to work with the defense science and technology agency as a civil engineer. Given the heightened threat of terrorism in Asia, I hope to contribute to the field of blast-resistant design.