WINTER 2023

# The Bent

Of Tau Beta Pi

THE ENGINEERING HONOR SOCIETY


## 2022 Convention Rundown

## Engineering and Design

# ALUMNI CHAPTERS

79 ALUMNI CHAPTERS
47 ACTIVE

*Inactive chapters shown in **BLUE***

## DISTRICT 1
Central CT, Hartford
Greater Boston Area, MA

## DISTRICT 2
Buffalo, NY
Central Jersey, NJ
LI Suburban, NY
Newark, NJ
New York City, NY
New York Capital District, NY
Rochester, NY
Southern Tier, Binghamton, NY

## DISTRICT 3
Lehigh Valley, Bethlehem, PA
Philadelphia, PA
Pittsburgh, PA
Wilmington, DE

## DISTRICT 4
Baltimore, MD
Hampton Roads, Newport News, VA
Kanawha Valley, Charleston, WV
Research Triangle, Durham-Chapel Hill-Raleigh, NC
Richmond, VA
Washington, DC

## DISTRICT 5
Atlanta, GA
Central FL, Orlando
Daytona Beach, FL
Gainesville, FL
Miami, FL
Midlands, Columbia, SC
Palm Beach/ Broward, FL
Piedmont, Clemson, SC
Puerto Rico
Tampa Bay, FL

## DISTRICT 6
Bluegrass, Lexington-Frankfort, KY
Central Alabama, Birmingham
Great Smoky Mountains, Knoxville-Oak Ridge, TN
Greater Gulf Coast, Mobile, AL
Louisville, KY
Mid-South, Memphis, TN
Rocket City, Huntsville, AL

## DISTRICT 7
Ann Arbor Area, MI
Central MI, Lansing
Cincinnati, OH
Columbus, OH
Dayton, OH
Flint, MI
Ohio's North Coast, Cleveland
SE Michigan, Detroit
West Michigan, Grand Rapids

## DISTRICT 8
Chicago Area, IL
Central Illinois, Urbana-Champaign
Indianapolis, IN
Milwaukee Area, WI

## DISTRICT 9
Kansas City, KS
Pioneer, OK
Rolla, MO
St. Louis, MO

## DISTRICT 10
Central Texas, Austin/San Antonio
North Texas, Dallas-Fort Worth
Greater New Orleans, LA
Texas Gulf Coast, Houston

## DISTRICT 11
Ames, IA
Minnesota, Twin Cities, MN

## DISTRICT 12
Pikes Peak, CO
Front Range, CO/WY
Salt Lake City, UT
Treasure Valley, Boise, ID

## DISTRICT 13
Albuquerque, NM
El Paso, TX
Phoenix, AZ
Sun City, AZ
Tucson, AZ

## DISTRICT 14
Columbia River Basin, Richland, WA
Portland, OR
Puget Sound, Seattle, WA

## DISTRICT 15
Sacramento Vly, CA
SF Bay Area, CA
SF Peninsula, Palo Alto, CA

## DISTRICT 16
Los Angeles, CA
Orange County, CA
Greater San Diego, California
Southern California

# COLLEGIATE CHAPTERS

257 COLLEGIATE CHAPTERS
626,125 MEMBERS

*6 Inactive chapters shown in **BLUE***

Α = ALPHA
Β = BETA
Γ = GAMMA
Δ = DELTA
Ε = EPSILON
Ζ = ZETA
Η = ETA
Θ = THETA
Ι = IOTA
Κ = KAPPA
Λ = LAMBDA
Μ = MU
Ν = NU
Ξ = XI
Ο = OMICRON
Π = PI
Ρ = RHO
Σ = SIGMA
Τ = TAU
Υ = UPSILON
Φ = PHI
Χ = CHI
Ψ = PSI
Ω = OMEGA

**AL ALPHA** Auburn University
**BETA** University of Alabama
**GAMMA** Univ. of Ala. at Birmingham
**DELTA** Univ. of Ala. in Huntsville
**EPSILON** Univ. of South Alabama
**AK ALPHA** Univ. of Alaska Fairbanks
**AZ ALPHA** University of Arizona
**BETA** Arizona State University
**GAMMA** Northern Arizona University
**DELTA** Embry-Riddle Univ., Prescott
**AR ALPHA** University of Arkansas
**BETA** Univ. of Ark. at Little Rock
**CA ALPHA** UC Berkeley
**BETA** Calif. Institute of Technology
**GAMMA** Stanford University
**DELTA** University of Southern Calif.
**EPSILON** UC Los Angeles
**ZETA** Santa Clara University
**ETA** San Jose State University
**THETA** Calif. State Univ., Long Beach
**IOTA** Calif. State Univ., Los Angeles
**KAPPA** Calif. State Univ., Northridge
**LAMBDA** UC Davis
**MU** Calif. Poly St. Univ., San Luis Obispo
**NU** Calif. State Poly Univ., Pomona
**XI** San Diego State University
**OMICRON** Loyola Marymount Univ.
**PI** Northrop University (inactive)
**RHO** California State Univ., Fresno
**SIGMA** UC Santa Barbara
**TAU** University of California, Irvine
**UPSILON** Calif. St. Univ., Sacramento
**PHI** University of the Pacific
**CHI** California State Univ., Fullerton
**PSI** UC San Diego
**OMEGA** Harvey Mudd College
**ALPHA ALPHA** Calif. St. Univ., Chico
**ALPHA BETA** UC Riverside
**ALPHA GAMMA** San Francisco St. Univ.
**ALPHA DELTA** UC Santa Cruz
**ALPHA EPSILON** Univ. of San Diego
**CO ALPHA** Colorado School of Mines
**BETA** Univ. of Colorado at Boulder
**GAMMA** University of Denver
**DELTA** Colorado State University
**EPSILON** Univ. of Colorado at Denver
**ZETA** U.S. Air Force Academy
**CT ALPHA** Yale University
**BETA** University of Connecticut
**GAMMA** University of Hartford
**DE ALPHA** University of Delaware
**DC ALPHA** Howard University
**BETA** Catholic Univ. of America
**GAMMA** George Washington Univ.
**FL ALPHA** University of Florida
**BETA** University of Miami
**GAMMA** University of South Florida
**DELTA** University of Central Florida
**EPSILON** Florida Atlantic University
**ZETA** Florida Institute of Technology
**ETA** FL A&M Univ.-FL State Univ.
**THETA** Florida International Univ.
**IOTA** Embry-Riddle Aero. Univ.
**GA ALPHA** Georgia Institute of Technology
**BETA** Mercer University
**GAMMA** Georgia Southern Univ.
**ID ALPHA** University of Idaho
**BETA** Idaho State University
**GAMMA** Boise State University
**DELTA** Brigham Young Univ.-Idaho
**IL ALPHA** Univ. of IL at Urbana-Champaign
**BETA** Illinois Institute of Technology
**GAMMA** Northwestern University
**DELTA** Bradley University
**EPSILON** S. Illinois Univ. at Carbondale
**ZETA** University of Illinois at Chicago
**IN ALPHA** Purdue University
**BETA** Rose-Hulman Inst. of Technology
**GAMMA** University of Notre Dame
**DELTA** Valparaiso University
**EPSILON** Trine University
**ZETA** Indiana Univ.-Purdue Univ. Indpls.
**IA ALPHA** Iowa State University
**BETA** University of Iowa
**KS ALPHA** University of Kansas
**BETA** Wichita State University
**GAMMA** Kansas State University
**KY ALPHA** University of Kentucky
**BETA** University of Louisville
**GAMMA** Western Kentucky University
**LA ALPHA** Louisiana State University
**BETA** Tulane University
**GAMMA** Louisiana Tech. University
**DELTA** Univ. of Louisiana at Lafayette
**EPSILON** University of New Orleans
**ME ALPHA** University of Maine
**MD ALPHA** Johns Hopkins Univ.
**BETA** University of Maryland
**GAMMA** U.S. Naval Academy
**DELTA** Univ. of Maryland Baltimore Co.
**EPSILON** Morgan State University
**MA ALPHA** Worcester Polytechnic Inst.
**BETA** Massachusetts Inst. of Tech.
**GAMMA** Harvard University (inactive)
**DELTA** Tufts University
**EPSILON** Northeastern University
**ZETA** University of Mass. at Amherst
**ETA** Boston University
**THETA** Univ. of Massachusetts Lowell
**IOTA** Western New England Univ.
**MI ALPHA** Michigan State University
**BETA** Michigan Technological Univ.
**GAMMA** University of Michigan
**DELTA** University of Detroit Mercy
**EPSILON** Wayne State University
**ZETA** Kettering University
**ETA** Lawrence Technological Univ.
**THETA** Oakland University
**IOTA** Univ. of Michigan-Dearborn
**KAPPA** Western Michigan Univ.
**LAMBDA** Grand Valley State Univ.
**MN ALPHA** Univ. of Minnesota-Twin Cities
**BETA** Univ. of Minnesota, Duluth
**MS ALPHA** Mississippi State University
**BETA** University of Mississippi
**MO ALPHA** Univ. of Missouri-Columbia
**BETA** Missouri Univ. of Science & Tech.
**GAMMA** Washington University
**DELTA** Univ. of Missouri-Kansas City
**EPSILON** Saint Louis University
**MT ALPHA** Montana State University
**BETA** Montana Tech. of the Univ. of MT
**NE ALPHA** Univ. of Nebraska-Lincoln
**NV ALPHA** University of Nevada, Reno
**BETA** Univ. of Nevada, Las Vegas
**NH ALPHA** Univ. of New Hampshire
**BETA** Dartmouth College
**NJ ALPHA** Stevens Institute of Technology
**BETA** Rutgers University
**GAMMA** New Jersey Inst. of Tech.
**DELTA** Princeton University
**EPSILON** Rowan University
**ZETA** The College of New Jersey
**NM ALPHA** New Mexico State University
**BETA** University of New Mexico
**GAMMA** NM Inst. of Mining & Tech.
**NY ALPHA** Columbia University
**BETA** Syracuse University
**GAMMA** Rensselaer Polytechnic Inst.
**DELTA** Cornell University
**EPSILON** New York Univ. (inactive)
**ZETA** Brooklyn Polytechnic (inactive)
**ETA** City College of CUNY
**THETA** Clarkson University
**IOTA** Cooper Union School of Eng'g.
**KAPPA** University of Rochester
**LAMBDA** Pratt Institute (inactive)
**MU** Union College
**NU** SUNY at Buffalo
**XI** Manhattan College
**OMICRON** SUNY at Stony Brook
**PI** Rochester Institute of Tech.
**RHO** NYU Tandon School of Eng'g.
**SIGMA** Alfred University
**TAU** Binghamton University
**UPSILON** U.S. Military Academy
**NC ALPHA** North Carolina State Univ.
**BETA** Univ. of North Carolina (inactive)
**GAMMA** Duke University
**DELTA** Univ. of NC at Charlotte
**EPSILON** NC A&T State University
**ZETA** East Carolina University
**ND ALPHA** North Dakota State University
**BETA** University of North Dakota
**OH ALPHA** Case Western Reserve Univ.
**BETA** University of Cincinnati
**GAMMA** Ohio State University
**DELTA** Ohio University
**EPSILON** Cleveland State Univ.
**ZETA** University of Toledo
**ETA** Air Force Institute of Tech.
**THETA** University of Dayton
**IOTA** Ohio Northern University
**KAPPA** University of Akron
**LAMBDA** Youngstown State Univ.
**MU** Wright State University
**NU** Cedarville University
**XI** Miami University
**OK ALPHA** University of Oklahoma
**BETA** University of Tulsa
**GAMMA** Oklahoma State University
**OR ALPHA** Oregon State University
**BETA** Portland State University
**GAMMA** University of Portland
**DELTA** Oregon Institute of Tech.
**PA ALPHA** Lehigh University
**BETA** Pennsylvania State University
**GAMMA** Carnegie Mellon University
**DELTA** University of Pennsylvania
**EPSILON** Lafayette College
**ZETA** Drexel University
**ETA** Bucknell University
**THETA** Villanova University
**IOTA** Widener University
**KAPPA** Swarthmore College
**LAMBDA** University of Pittsburgh
**MU** Penn State Erie, Behrend College
**PR ALPHA** University of Puerto Rico
**RI ALPHA** Brown University
**BETA** University of Rhode Island
**SC ALPHA** Clemson University
**BETA** University of South Carolina
**GAMMA** The Citadel
**SD ALPHA** S. Dakota Sch. of Mines & Tech.
**BETA** South Dakota State University
**TN ALPHA** University of Tennessee
**BETA** Vanderbilt University
**GAMMA** Tennessee Tech. University
**DELTA** Christian Brothers Univ.
**EPSILON** University of Memphis
**ZETA** Univ. of Tenn. at Chattanooga
**TX ALPHA** University of Texas at Austin
**BETA** Texas Tech. University
**GAMMA** Rice University
**DELTA** Texas A&M University
**EPSILON** University of Houston
**ZETA** Lamar University
**ETA** Univ. of Texas at Arlington
**THETA** Univ. of Texas at El Paso
**IOTA** Southern Methodist University
**KAPPA** Prairie View A&M University
**LAMBDA** Texas A&M Univ.-Kingsville
**MU** Univ. of Texas at San Antonio
**NU** Univ. of Texas Rio Grande Valley
**XI** University of Texas at Dallas
**UT ALPHA** University of Utah
**BETA** Brigham Young University
**GAMMA** Utah State University
**VT ALPHA** University of Vermont
**BETA** Norwich University
**VA ALPHA** University of Virginia
**BETA** Virginia Poly. Inst. & State Univ.
**GAMMA** Old Dominion University
**DELTA** Virginia Military Institute
**EPSILON** Virginia Commonwealth Univ.
**WA ALPHA** University of Washington
**BETA** Washington State University
**GAMMA** Seattle University
**DELTA** Gonzaga University
**WV ALPHA** West Virginia University
**BETA** West Virginia Univ. Inst. of Tech.
**WI ALPHA** Univ. of Wisconsin-Madison
**BETA** Marquette University
**GAMMA** Univ. of Wlisconsin-Milwaukee
**DELTA** Milwaukee School of Eng'g.
**EPSILON** Univ. of Wisconsin-Platteville
**WY ALPHA** University of Wyoming

WINTER 2023

# The Bent

WINTER 2023 | VOLUME CXIV | No. 1

## FEATURES:



## REPORTS:



## DEPARTMENTS:




**COVER:** The roughly 350 attendees at the 2022 Convention gather in front of the historic Ayres Hall on the University of Tennessee campus. The Sunsphere is the backdrop, which was built for the World's Fair in 1982.
**Artist: Dali Polivka**



Tau Beta Pi was founded at Lehigh University, South Bethlehem, PA, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent and Trademark Office.

Member, *American Society for Engineering Education*; co-founder *Association of College Honor Societies*; and Affiliate, *American Association for the Advancement of Science.*


**06** Evolution of the design process; part of a series on engineering and the creative arts.

**14** Read about the first in-person Convention since 2019.

**20** Images and summaries of 2022 Chapter Project Awards.

**VISIT** www.tbp.org

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# COUNCIL'S CORNER

**Rachel K. Alexander, P.E.,** *CA Y '15*, ΤΒΠ 2023 President

## ATTENDING A TBP CONVENTION — AS A DELEGATE

When asked to write about Convention, I wondered how to sum up the 2022 Convention and create a narrative. Each time I sat down to write, it seemed like a key ingredient was missing that would make the words flow from my fingers over the keys. Where I found myself struggling was that only listing the agenda, committees, and award winners left much of the detail out of the picture. Constitution Article IX provides the outline of Convention by defining voting delegates, what constitutes a quorum, order of business, the committees, and their responsibilities. What is *not* described in the Constitution is how it feels to attend Convention, how business is accomplished, and the people who make it all happen. Let me share those details with you and fill in that outline with the rich texture of the experience.

Tau Beta Pi's governing body is the annual Convention, composed of one voting delegate from each collegiate and alumni chapter, Program Directors, Executive Council (EC), and one director from each of our 16 Districts. There are about 400–500 total attendees between the voting and non-voting members. ΤΒΠ is proud to be a student-run organization with the majority of voting delegates from 251 collegiate chapters. Convention is typically held annually, but this was our first in person since 2019 due to the COVID-19 pandemic. Delegates devote their time for three days to discuss, deliberate, and ultimately decide on granting new chapters, electing EC members, amending the Constitution and Bylaws (C&B), selecting and setting future Convention sites, and program petitions. The responsibilities of Convention are laid out in Article IX, Section 7. The EC, which is composed of nine elected alumni members and the Executive Director, serves as the second governing body for the Association. Prior to Convention, the President and Executive Director prepare an Order of Business for recommendations to the Convention and background materials are prepared for Convention Committees. The Standing Committees are Awards, Chapter and Association Financial Affairs, Constitution and Bylaws, Convention Site, Petitions, Resolutions, and Rituals. For the 2022 Convention, the Council authorized *ad hoc* Committees for Alumni Chapters, Image and Marketing, Program Review, Website, New Engineering Solutions for Tomorrow (NEST), and Diversity, Equity & Inclusion (DEI). Headquarters assigns delegates to the committees based on the indicated interests during Convention registration and business for each committee. Committee materials are uploaded to the Convention website and are available for all delegates to review, except for some limited materials which are kept private such as the ritual and chapters that the Awards Committee are considering.

The Convention takes place over three days of events starting on Thursday with the First Business Meeting. This meeting officially opens Convention, introduces the officials, presents reports of officers, welcomes all attendees, and approves the Agenda. The Convention has a presiding Convention Chair, Parliamentarian, and a Tellers' Committee, and the meetings follow the latest version of *Robert's Rules of Order* for efficiency. Delegates go to their assigned committees to select a chair, vice chair, and recording secretary; some committees organize themselves further into several small groups with multiple vice chairs. Each committee is assigned at least one alumni advisor who acts as a mentor to the committee. The committee chairs attend an orientation session while other delegates may choose from Professional Development Sessions and the Career Fair. The committees discuss their charges internally and prepare for their appointed slot in the business meeting agenda.

Delegates develop leadership, team communication, time management, and presentation skills while working under a tight deadline. As a former chapter president, I served on the Awards Committee and reviewing chapter reports for the different awards inspired me to take some of their event ideas back to my own chapter. As an alumni chapter delegate, I served on the C&B Committee that was presenting a large revision to the Constitution. In both committees, we organized work into smaller segments, checking in with the chair and vice chair, discussed with the committee, and prepared the presentation. This year, committees had business for two years to complete and collaborated with each other on topics that overlapped.

Depending on the committee, some may present recommendations that will be provided to the EC to review, and others make motions for debate. The Convention Chair introduces the committee and often this chair will speak from the podium with prepared slides. A motion made by the committee requires a second by the Convention for discussion. Traditionally, it is quite an honor to be the chapter that seconds a motion for debate so there is great enthusiasm in shouting one's chapter to be recorded in the Convention Minutes. There are several strategies delegates have utilized to be the recorded chapter that seconds a motion, such as being the first or last to call out one's chapter. After the motion is seconded, the Convention Chair gives the right of first debate to the committee and typically they will have several members lined up to talk about the motion.

**Council's Corner continues on page 39.**

# YOUR LETTERS

Send letters to media@tbp.org. Text may be edited for length and clarity; not all letters can be published.

## Fusion Ready for Prime Time

I found the recent article on fusion highly entertaining. As a good friend of mine has said, it's the technology of the future and it always will be. For context, I spent the start of my career on an alphabet soup of fusion projects including LCP, TNS, ETF, MFTF-B, and EBT-POP. I did both technical work and program management. My managers and mentors were a group of men at GE who had worked on the Apollo program which, lest we forget, put a man on the moon in ten years from essentially a standing start. Their view of fusion was unanimous: this is the single most difficult engineering problem mankind ever faced. The technological improvements covered so well in your article are indeed impressive and encouraging, as is the explosion of private funding intended to make fusion a reality someday. The simple fact is that fusion is less a technological challenge than a systems engineering problem. I remember the final report of a conceptual study on a fusion reactor showing a cross section that included several circles that were blank. The accompanying caption noted that those spaces needed to accommodate several subsystems but space was available for only one. As the various startup companies attempt to limit the size of fusion devices to reduce their cost, this problem of course becomes more difficult, not less so. In the meantime, the international energy community has made an enormous wager on ITER to demonstrate the feasibility of fusion. ITER has become a case study on how not to manage a large project. I have lost track of the number of project directors ITER has had, but it really doesn't matter because the director doesn't have the ability to make decisions without satisfying a large committee of constituents. If I were a betting man, I would bet that at least some of these constituents will lose faith and withdraw their funding and ITER will never operate.

***John P. Heinrich, Ph.D.,*** *IN Γ '69*

## Fusion Ready for Prime Time

Thank you for the very informative article about fusion reactors. I can understand the current focus on getting the output energy of the reactor to be greater than the energy to sustain the reaction (Q>1); however, I have not seen any proposals on how to convert this excess output energy into "useable" energy. For fission reactors, the core is immersed in a fluid heated by the core and this fluid then converts water to steam to drive a turbine. How are the proponents of the different fusion reactors planning to extract this excess output energy for usable purposes?

***Thomas F. Lyons Jr., P.E.,*** *FL Γ '76*

## Fusion Ready for Prime Time

Alan Brown did an excellent job providing a balanced overview of fusion energy research, a subject that is extremely complicated and difficult to summarize. One essential aspect of fusion research that he and others do not recognize is the absence of commercially-trained engineers from fusion research guidance and evaluation. The federal fusion program is aimed at the development of a practical electric power source. The mainline program of roughly $650 million per year is focused roughly 85 percent on the tokamak concept, but that concept has evolved into an engineering nightmare, since my team and I focused the U.S. program on tokamaks in the mid 1970s. Back then, an extensive and comprehensive tokamak fusion reactor study indicated tokamaks appeared to have a good chance of commercial viability. However, the physics and technology of tokamaks have evolved into a much more complex and ungainly concept. While U.S. fusion research has funded a modest level of tokamak power plant analysis, the program has systematically ignored the negative messages those studies have produced. Why? Because the program has been managed by physicists who have "circled the wagons" to protect their current tokamak-related research. Irresponsible? Yes, but to squarely face up to evolving realities would mean admitting failure and having to dramatically regroup around more attractive concepts. There have been periodic fusion program reviews over the decades, but they have involved almost totally physicists, who have protected their large facilities and their employment. There has never been a review by a team of experienced power plant engineers, and Department of Energy political management has simply accepted the promise of fusion and left fusion program direction to the "foxes who guard the hen house" (i.e., those with a vested interest have been allowed to assume that the primary barrier to success is physics and once that work is complete, they can hand off their concept to the engineers to commercialize it). Not surprisingly, they have not considered that their creation has evolved into a monstrosity that is far from commercially viable. Among the tokamak fusion shortcomings is the inadequate future world supply of tritium that Mohamed Abdou of UCLA and colleagues have pointed out for over two decades. That means that there is unlikely to be enough tritium to fuel tokamak power reactors, as Brown noted. Add to that the world lacks lithium six refining supply. Lithium six is critical to a DT fusion concept to breed tritium fuel in situ for continued operation. While the list of other shortcomings is large, add to them that the huge magnets in a tokamak power plant must forever work perfectly, because if they were to accidentally go normal, they could release the energy of a World War II block buster bomb. What is needed is a comprehensive and ongoing review of all fusion concepts on a periodic basis by commercially experienced engineers to enumerate the strengths and weaknesses of the various concepts. That would provide guidance to allow proponents to address shortcomings. If, over time, the weaknesses are not successfully addressed, then financial support for a particular concept should be reduced or eliminated in favor of concepts that appear to be more potentially viable. After over 50 years of involvement in a wide array of practical electric power production concepts, including fusion, I continue to have great hopes for practical fusion power, but so far, there is only hope and no clearly winning approach.

***Robert L. Hirsch, Ph.D.,*** *IL A '58*

Letters continue on page 42.

# FROM THE EDITORS

**Dylan Lane** and **Patricia McDaniel**

From all of us at Tau Beta Pi Headquarters, we wish you and your family a safe and happy holiday season and a prosperous New Year.

We love to hear from our readers, so please reach out and let us know how we can make *your* magazine better.

Contact us at: media@tbp.org

# WHO'S WHO IN TAU BETA PI

Recognizing Tau Bate accomplishments.

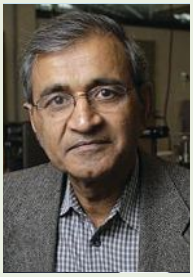
## David L. Allara Ph.D.

*California Alpha '59*

has been named a 2022 Kavli Prize Laureate in the field of nanoscience by the Norwegian Academy of Science and Letters. He is a distinguished professor emeritus of chemistry and materials science & engineering at Penn State University whose work "shows that self-assembled monolayers strongly bond to bare metal surfaces." The $1 million-dollar prize will be split among the four laureates in the nanoscience field.

## Bharat Bhushan Ph.D.

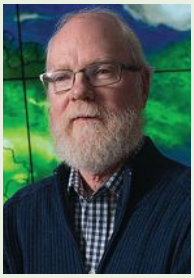
*Colorado Beta '74*



received the Gold Medal of the International Tribology Council for lifetime achievements in the field of tribology. The award recognizes his five decades of outstanding contributions to the advancement of tribology, the study of friction, wear, lubrication, and design of bearings and science of interacting surfaces in relative motion. He is a mechanical and aerospace eng'g professor at The Ohio State University.

## Gregory R. Carmichael Ph.D.

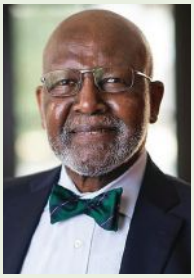
*Iowa Beta '74*



was named a fellow of the American Meteorological Society. He is a professor of chemical and biochemical eng'g and director of the University of Iowa (UI) Informatics Initiative. In 1978, he joined the UI College of Engineering and has a research focus on the development of comprehensive air quality models and their application to regional and international air pollution problems.

## Wesley L. Harris Ph.D.

*Virginia Alpha '64*



was elected to serve a four-year term as National Academy of Engineering (NAE) vice president. He is a professor of aeronautics and astronautics at MIT. Harris was elected to the NAE in 1995 for contributions to the understanding of helicopter rotor noise, the encouragement of minorities in engineering, and service to the aeronautical industry. He previously worked as an associate administrator at NASA.

## H.M. Hashemian Ph.D.

*Tennessee Alpha '80*

received the Presidential Citation of the American Nuclear Society (ANS) which recognizes outstanding effort to benefit the society and the nuclear energy community. He is president and CEO of the Analysis and Measurement Services Corporation, holds three doctoral eng'g degrees, is a ANS Fellow, and currently serves as Chairman of the honors and awards committee.

## David O. Hubble Ph.D.

*Tennessee Alpha '06*

was awarded the Dr. Delores M. Etter Top Scientists and Engineers of the Year Award by the U.S. Department of the Navy. A Naval Surface Warfare Center Dahlgren Division engineer, he is cited for developing a scalable, flat plate calorimeter to measure power on target of state-of-the-art, high energy laser weapon systems. He holds a B.S. and a Ph.D. in mechanical eng'g from Virginia Tech.

## Ayan Kishore

*Georgia Alpha '06*

was appointed CEO of Benetech, a leading software for social good nonprofit, in December 2021. A leader in technology for social impact and international development, he previously founded and directed a digital social innovation lab at Creative Associates International focused on global literacy and peacebuilding. He earned a B.S. in computer eng'g and an M.S. in human-computer interaction.

## William V. Mars Ph.D., P.E.

*Ohio Kappa '94*

was named winner of the Harold Herzlich Distinguished Technology Achievement Medal that recognizes a tire industry pioneer for a career and accomplishments that have advanced the industry. He is an international leader in the failure mechanics of rubber, has 30+ years of experience developing testing and simulation methods in the rubber industry, and is founder and president of Endurica LLC.

## Karen J. Ohland

*Pennsylvania Kappa '83*

recently began her term as the 141st president of the American Society of Mechanical Engineers (ASME), where she's an ASME Fellow and an active member since 1983. In addition, Karen is associate director for finance and operations at the Princeton University Art Museum, previously worked as a biomedical engineer in industry, academia & government, and has a B.S. eng'g degree from Swarthmore College.

## Arati Prabhakar Ph.D.

*Texas Beta '79*

was nominated by President Biden and approved by a vote in the Senate to serve as Director of the Office of Science and Technology Policy, and as Assistant to the President for Science and Technology. This makes her the President's Chief Advisor for Science & Technology. She previously served as Director, Defense Advanced Research Projects Agency (DARPA) and headed the NIST.

## Thomas P. Van Doren Ph.D.

*Missouri Beta '62*

received the Hall of Fame Award from the IEEE Electromagnetic Compatibility (EMC) Society for his pioneering work in the EMC field. He was recognized "for a lifetime of exemplary achievement in EMC education" and is professor emeritus of electrical and computer eng'g at Missouri Univ. of Science and Technology. He developed and taught short courses on grounding and shielding at Missouri S&T for nearly 40 years.

## Dylan H. Ward P.E.

*Kentucky Gamma '13*

was named a co-recipient of the 2022 New Professional of the Year Award sponsored by the National Society of Professional Engineers. He serves as a project manager with the City of Henderson (KY) where he has been employed for the past eight years. As an undergrad at Western Kentucky Univ., Dylan was KY Gamma Chapter VP, earned a degree in civil eng'g, and was 2012-13 National-Qualifying ASCE Steel Bridge Team co-captain.

## Jill S. Tietjen P.E.

*Virginia Alpha '76*

was elected to the National Academy of Construction as a member of its class of 2022. She is president and CEO of Technically Speaking, Inc., a consulting firm for electrical utilities headquartered in Colorado. Jill was cited for being an "exceptional leader in the electric utility sector, strong advocate for women worldwide, and prolific author on women and women's issues." Jill was awarded the 2004 ΤΒΠ Distinguished Alumna Award for integrity and service.

## Lav R. Varshney Ph.D.

*New York Delta '04*

was appointed a 2022-23 White House Fellow. He will spend a year at the National Security Council with the Deputy Advisor for Cyber and Emerging Technology. Lav is a professor of eng'g, computer science, and neuroscience at the Univ. of Illinois at Urbana-Champaign where he conducts research, technological innovation, and broad public engagement. In addition, he works with Brookhaven National Laboratory on computing for national security.

## Robert M. Wagner Ph.D.

*Missouri Beta '93*

was elevated to the grade of senior member of the Institute of Electrical and Electronics Engineers (IEEE). He is a division director for the Building Transportation Science Division at the Oak Ridge National Laboratory. He leads a team focused on building technologies, propulsion science, and vehicle systems research, and is a founding member of the Dept. of Energy's Co-Optimization of Fuels and Engines initiative.

## Statement of Ownership, Management & Circulation

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I certify that the statements made above are correct and complete. —*Curtis D. Gomulinski, Executive Director*

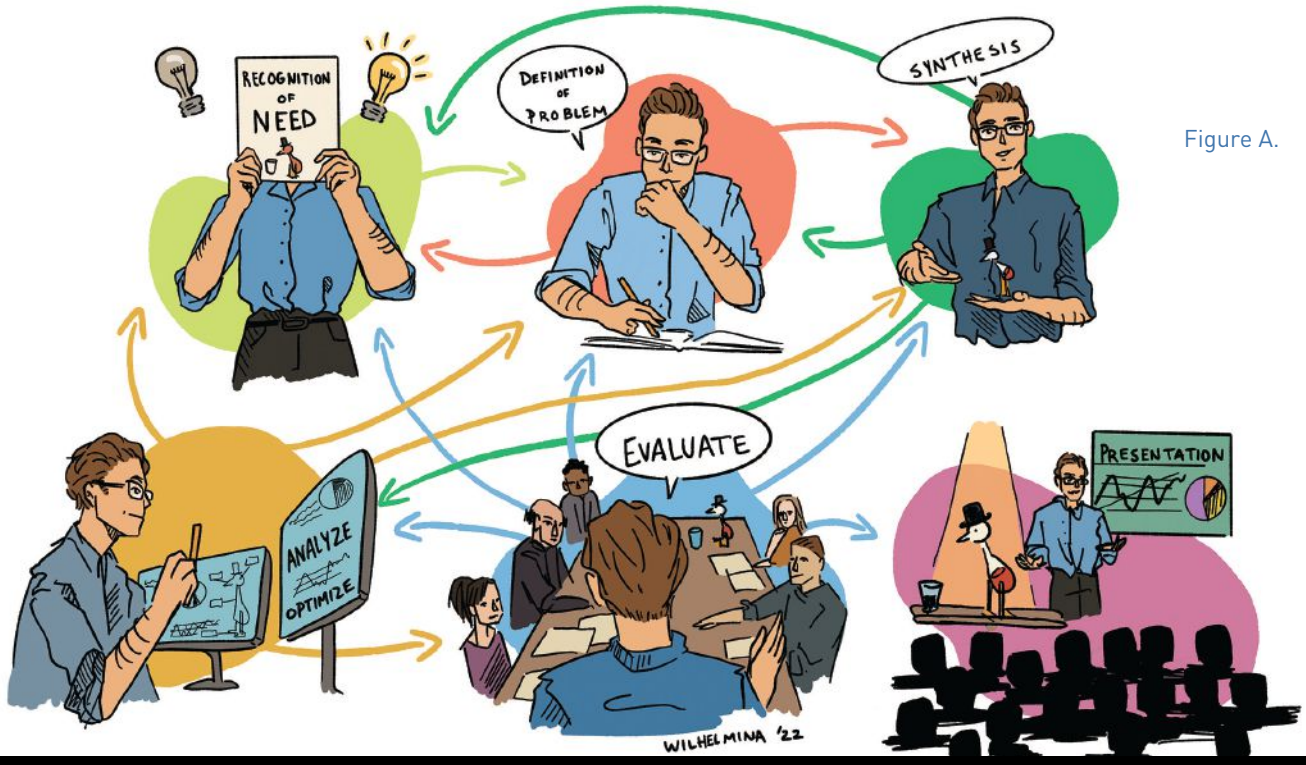



Figure A.

# Engineering and Design

BY BRIDGET A. MOORMAN, COL, USAF (RET.), *ARIZONA BETA '85*

Part of a Series on How Engineering Supports the Creative Industries and Arts

## Evolution of Design Process

From an early engineering perspective, to design is "to formulate a plan for the satisfaction of a human need (and) in contrast to scientific or mathematical problems, design problems have no unique answers....design has an authentic purpose — the creation of an end result by taking definite action or the creation of something having a physical reality."[1] The preceding definition is from a mechanical engineering textbook from the 1970s and is abstract enough to still apply to both engineering and design endeavors. The book identifies these phases of design (see also Figure A above).

***Recognition of the need***: "phrasing (of the need) is a highly creative act because the need may be only vague discontent, a feeling of uneasiness, or a sensing that something is not right."[2]

***Definition of the problem:*** This is more specific and includes all the specifications for the thing that is to be designed: inputs, outputs, characteristics, dimensions, and all limitations.

***Synthesis***: analysis and optimization: this step is iterative with analysis and optimization. Analysis is to see how performance complies with the specifications.

***Evaluation***: This is the final proof of the hopefully successful design and usually involves testing of a prototype.

***Presentation***: Interestingly, this book exhorts engineers to have good communication skills (oral, written, and graphical) as these are used in evaluation and presentation of the design.

The design process has evolved since the 1970s to emphasize more iteration across all the phases of design versus the sequential process described above, as well as have more focus on the human component or user requirements. This is termed Human Centered Design (HCD) and ensures that people's needs are met, the resulting product is understandable and usable, it accomplishes the desired tasks, and the experience of use is positive and enjoyable. HCD is a process for addressing these requirements with the emphasis on solving the right problem and doing so in ways that meet human needs and capabilities.[3]

The Human Centered Design process has three overarching phases, each of which has two sub-stages. However, it is a circle and therefore is continuous (Figure B). Another currently well-accepted design process is the Double-Diamond (Figure C), which reflects the iterative nature of the process. The first phase is to **understand/discover** and consists of the stages **empathize and define**. Empathizing underscores research into what users do, say, think, and feel. **Define** is an aggregation and observation stage after the research. The next phase is **explore/develop**, which consists of **ideate and prototyping** stages. Ideate is similar to brainstorming. The next stage brings the ideas into the physical world to see what works. The following phase is **materialize/deliver** and has **test** and **implement** stages. Test involves the users for

feedback on the prototypes and implement is to finalize the vision of the design.

The main difference between the engineering design process and HCD processes described above is more user involvement across all the different stages of the HCD process. Modern designers test their ideas with users at every stage of the process shown in Figures B and C. Early testing speeds up the process by discovering critical issues very early in the process. As the cycle progresses through the stages depicted in Figure B or the two diamonds of Figure C, the prototypes are continually modified, each time getting closer to the final ideas, and at the end, actually working. Note that the same process works on all sorts of designs: physical devices, software, or even the design or procedures of organizational structures.

## HUMAN COGNITIVE STRENGTHS AND WEAKNESSES FOR DESIGN PURPOSES

Dr. Donald Norman, an engineer, designer, and psychologist has written about and participated in design and the design process for over five decades. Some of his earlier psychological research studies covered cognitive limits of humans and how to accommodate those limits in human interface design. His research conclusions have highlighted that humans excel at reflection, a weak method for decision making and control due to the variability of their environment. Machines or computers excel in reaction and routine, strong methods of decision making, and control. [6] "People are creative, constructive, exploratory beings particularly good at novelty, creating new ways of doing things, and seeing new opportunities... alert to changes in the environment, noticing new things, and then thinking about them and their implications. Dull, repetitive, precise requirements fight against these traits. The human virtues get turned into negative features when forced to serve machines."[7] He advocates that design must be human centered and solve the right problem.

Figure A, based on the Figure 1-1 in the book and referenced, is on page six and was illustrated by Wilhelmina Hill-Bearhs.

## ENGINEER VERSUS DESIGNER

Dr. Norman highlights the difference between the traditional engineering mindset and that of a designer: designers are trained to discover the real problems; engineers are trained to solve problems. Engineers can tend to be too logical and/or too constrained or have the wrong expectations about human users or dismiss the visceral. Engineers also tend to be more subjective, so at times do not understand the emotional component of design."[8] Moreover, "engineers...(usually) don't start with the proverbial blank sheet of paper each time they do something. Rather, they build on existing technology and try to improve incrementally on its performance."[9] They "use codes and standards that have evolved within each technology; consider the safe state of practice and lessons learned from past failures. But every engineer's core mission is to try to improve the utility of things, to design products or processes that will solve problems better, faster, and cheaper... our core engineering principles can compel us to follow the same step-by-step approaches we learned in engineering school."[10] This difference in perspective, with regard to the design task at hand and the problem solving process, can at times cause frustration on the part of the participants in the design process. It can also lead to design failures.

## WHAT IS THE PROBLEM?

One can look at the design process as a widening and narrowing of an aperture on an issue or a need. Depending on where one is in the design process, the aperture might need to be modified. Sometimes the aperture might need to be moved to a different area to solve a problem. "I never solve the problem I am asked to solve. Invariably, the initial problem statement is a symptom of the root problem, so how do you know you solved the correct problem?"[11] There is a tendency to design for intermediate steps due to technology lag, limitation, or availability, so the wrong problem is solved. If the original idea or problem is fully understood, the intermediate steps could be eliminated or 'placed under the skin' to be exposed, if needed.[12]

## SYSTEM COMPLEXITY AND USER ERROR

When designing, the designer must expect errors on the part of the user, so that should be an assumption with the design. Norman argues what is called "user error" is almost always a result of poor design. "Removing system complexity or mapping and managing the complexity so the user can intervene if something goes wrong" is the best way to minimize system confusion when dealing with an error for a user. This involves providing a good, accurate conceptual model of the design for the user.

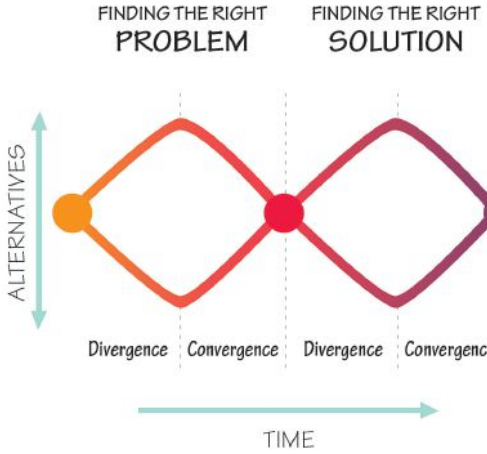
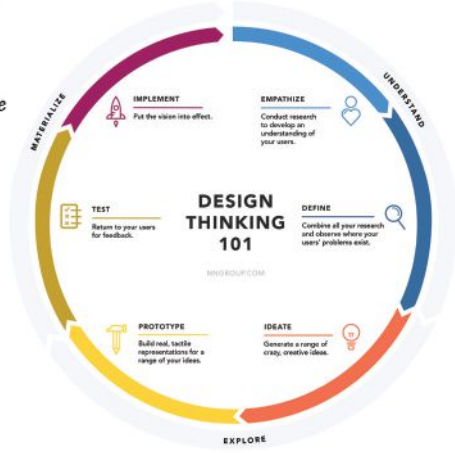



Figure C[5].

Figure B[4].



Dr. Norman talks about "bridging the gulf of execution and gulf of evaluation. On the execution side, provide feed forward information; make the options readily available (while) on the evaluation side, provide feedback, mak(ing) the results of each action apparent."[13] A good example of this 'bridging' is with current printer designs which usually show a series of visual depictions of how to use as well as to 'troubleshoot' and/or fix a problem guiding the user through the steps. However, notice the visual depiction of assistance is only useful for a fairly simple problem. As with many products today, there is a reliance on the underlying computer network, which introduces complexity in determining how to fix a problem with an integrated system design. In the case of the printer, it could be a printer issue, a network issue, a software issue, or a combination of these making it extremely difficult to find the cause of the 'error.' These are design problems that still have not been overcome. Here is where human-centered designers and engineers need extensive collaboration to produce a design that helps people troubleshoot the issues (or better yet, prevent these issues from happening).

Another example of an attempt to manage complexity is in the medical technology realm. Many medical devices using physiological sensors are indirect measurements of a physiological state. This is an example of the "'sensor problem' where seldom what is measured is what is exactly wanted, i.e., it usually is an indirect indication of what is desired."[14] In a specific example, an electrocardiogram is a series of electrical waveforms measured and displayed that indirectly depict how the heart works to deliver blood to the body. A patient monitor can measure other physiological items of interest like blood pressure, pulse oximetry, and respiration rates. The combination of these measurements provides a more complete picture of a patient's physiological state. However, current EKG machines and patient monitors require that the user build a two- or three-dimensional map in their head regarding how the cardiovascular or respiratory system is working based on the waveforms or data items displayed. As these data items are indirect


Figure D: Patient monitor picture

indications of the underlying systems that interact and are integrated in the human body, a clinician could be justified in being overwhelmed with the 'engineering-centric' design approach used in measuring and displaying this information. *Use Case One* shows how the integration of physiological monitoring systems' data was redesigned to meet the needs of the clinician while also allowing access to the data driving the system, if required.

## THE EMOTIONAL COMPONENT OF THE USER IS DESIGN

"It is not enough that we build products that function, that are understandable and usable; we also need to build products that bring joy and excitement, pleasure and fun, and, yes, beauty to peoples' lives."[15] This is the area in which engineers may not be most adept. Designers opt to produce pleasurable experiences, which at times can be too subjective for engineers. A seemingly whimsical aspect to a product which has a clear function can bring about a visceral, emotional experience in the user, which many times may override any small design defaults. It can be difficult to optimize all three aspects of Dr. Norman's three emotional design levels: 1) visceral, pertaining to the aesthetic of a design; 2) behavioral, pertaining to the function and usability of a design; and, 3) reflective, pertaining to the prestige and value associated with the design.[16] Nevertheless, engineers are humans, too, and many times will opt for designs that are both emotionally and functionally satisfying. Ask many users of Apple products (engineers and non-engineers), and their zeal with regard to the company and its products is demonstrative of the successful emotional design theory. *Use Case Two* is another example of optimizing aesthetic, function, and value in a design. Interestingly, the designer is an engineer, but his over arching goal for the product also included an aesthetic component.

## SUMMARY

The successful design process requires a multi-disciplinary approach with experts across those disciplines including business and design personnel. Not all engineers can or should also be designers; however, engineers are an essential part of the design process especially regarding the creation of a physical reality. "They understand the technical components, make things that work and are reliable, with significant constraints: time, budget, external, and internal requirements." Designers uncover the real issues or define problems; engineers build the products to manage or solve those problems. Rarely are both of those capabilities available in one person, so multi-disciplinary teamwork is and will be required for creative solutions to modern problems. Nevertheless, if an engineer wants to be successful in the design process, they will need to understand human behavior while also mastering the traditional engineering disciplines. This will become even

more important in the future as we will need to design things that make humans smart. "Without external aids, deep, sustained reasoning is difficult; the future is devising (those) external aids that enhance cognitive abilities, which complement abilities, and strengthen mental powers."[17]


Figure E: ICU monitor

## USE CASE ONE

A new patient monitor — a demonstration of visual simplicity overlaying a complex mathematical algorithm to assist clinicians in being clinicians and not engineers. This is an example of having the knowledge embedded in the product and letting it assist the human in doing what they do best: think and problem solve.

For several decades, Dr. Randall Moorman, MD, University of Virginia, and Dr. Matthew Clark, Ph.D., previously AMP3D and now Nihon Kohden, have been researching and developing data-driven predictive medical devices to assist clinicians in administering care. In a 2018 interview, Dr. Moorman discussed how a 1985 research paper was seminal in identifying how the measurement of heart rate variability could determine heart attack probability in adults. "The underlying idea is that a dynamical system has an invariant measure called entropy...which can be thought of as the unpredictability of a system state or the average information content of a system state. By defining physiological 'phenotypes' comprised of a specific set of physiological variables (for example: heart rate, beat-to-beat variability, certain lab values, etc.) and system states for underlying physiological systems, one can measure the entropy of that system and in effect build a probabilistic model with regard to how the dynamical system will behave."[18]

One area in which this idea has been applied is in the prediction of sepsis in the clinical setting. Moorman and Clark developed the Continuous Monitoring of Event Trajectories (CoMET®) monitor (which has since been purchased by Nihon Kohden), based on the decades of research in developing and using algorithms to aid in clinical decision support for sepsis. Where their design is different from other clinical decision support systems is in the way the information is displayed for a clinician. In a traditional patient monitor, each physiological measurement (variable) is displayed with traditional signal characteristics (Figure D). This type of a display in essence forces a clinician to understand the signal morphology, or number, on a dynamic display and what the physical manifestation of that signal means with regard to the human anatomy or physiology within the survival range. For patients in critical condition, this means one would see an EKG (possibly several leads), a pressure wave, and several numerical measurements cascading vertically and horizontally on one or several screens. This data is then integrated into an aggregated database, electronic health record, which provides another view of the data and can also have background algorithm development and decision support provided on the algorithms' predictions. This forces the clinician to assimilate the information and use their analytical skills in their working memory to analyze the data as it is presented.

Moorman and Clark wanted a different 'monitor' and worked with "user interface experts to design the interface to depict a projection of the current patient state over time in a three dimensional space." This led to the comet tail-like indicators for direction and extent of patient state movement, the axes depicting of physiological system indicators, and the colors indicating severity. It is a temporal indicator of a set of complex variables that have been shown to represent the trend of a patient's status with regard to specific high-risk and impact low-probability critical clinical events. The display has a respiratory based indication on the vertical axis and cardiovascular based indication on horizontal axis (Figure E). The points on display are based on the predictive model indication of that particular physiological function. It takes into account all of the relevant specific sensor data points (heart rate, beat-to-beat variability, EKG waveforms, respiration rate, temperature, and other time-series based physiological data points, etc.) and depicts a physiological function status and trend. It is a virtual medical device which is derived from the raw sensor data and provides predictions through risk estimates of multiple adverse events on the disease state and how it is affecting the different physiological systems and functions. There are no alarms and the display design is intended to nudge the attention of a clinician towards starting their rounds on a specific patient or highlighting where to focus

**"HE BELIEVES THAT HIS ENGINEERING BACKGROUND ENSURES HIS PRODUCT DESIGNS GIVE SKATERS THE 'PEACE OF MIND' THAT THE TOOL IS RELIABLE, EFFICIENT, AND LONG-LIVED."**

Figure F: L-shaped Wrench

Figure G: The Gripz Tool

Figure H: The Pro Tool

Figures F, G & H used courtesy of Cliff Chi, CEO, Sonic Sports Inc

their attention when administering care to a patient. The idea is to inform the clinician on the patient state and then rely on the fact they know how to take care of the patient.[19]

## USE CASE TWO

Cliff Chi, inline skater and engineer, designs tool to minimize "bloody knuckles" and time to reposition and rotate skating wheels so he can "spend more time playing roller hockey," an example of a product that performs well while delivering pleasure, beauty, and fun.

Chi, CEO of Sonic Sports Inc., wanted to design a functional skate tool that was also elegant.[20] From a functional standpoint, he wanted the user to have enough space to work with the tool without causing harm (busted and bloody knuckles). He also wanted a product that was robust; a skater could trust that the tool would solve their problems reliably for a long time. An L-shaped wrench handle (Figure F) uses a 90 degree angle; his tool was based on his childhood experiences repairing bicycles and using tri-spoke bicycle tools. He wanted the tool he designed to fit all skates. He is in the sporting goods market, so the look of the tool (colors and materials used are not 'boring') was also important and a market differentiator. The final tool design is two pieces of heat-treated steel, one bent, the other straight, molded together with a plastic injection mold for the handle.

The Gripz Tool (Figure G) was Sonic's original compact skate tool and combined all the functions that an inline skater would need to keep rolling. The Gripz Tool was so popular and sturdy that it became the tool of choice for skate shop technicians. The only drawback was that the tool was compact so it could be uncomfortable to use all day (dig into large hands). As a result, Chi designed the Pro Tool (Figure H), which was larger to provide more comfort and leverage in removing stubborn axles. Skate wheels have bearings and must be rotated and re-positioned due to side stresses on the wheels when skating to ensure even wear over the wheel. The forces pushing on the inner wheel wear down that side of the wheel, more than the outer part of the wheel which without rotation/re-positioning, causes poor traction and loss of acceleration. The wheels are attached to the frame with an axle which needs to be removed to get to the wheels for re-positioning and rotation. With an L-shaped wrench, human knuckles don't have clearance room to maneuver, so would end up getting harmed or 'bloodied.' He also wanted to minimize the time a skater needs to rotate the wheels so they can spend more time skating.

He designed Gripz in 1991 and traveled to Taiwan to find a manufacturer. Over the years, he has added features and updated the design to the Pro Tool to include: magnetization of the tool bits which is like having a third hand when using the tool (it also helps with product differentiation); adding a T25 Torx bit to fit more skate brands; and an evolution of the bit material from Chrome Vanadium (CRV) to S2, a more impact resistant steel with better longevity. He believes that his engineering background ensures his product designs give skaters the 'peace of mind' that the tool is reliable, efficient, and long-lived. Interestingly, his tool can be used not just for skating maintenance purposes. The bits are standard and can be used for any rotational mechanical activity required in any repair endeavor. He has even received a video from a skater stating they used the tool to fix their 'loo.'

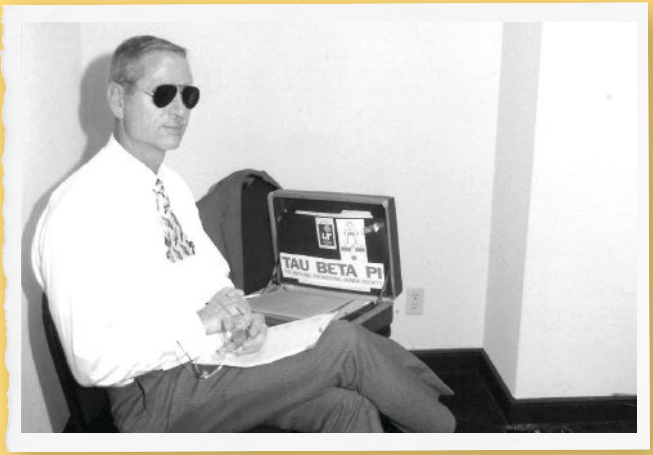
The original Gripz design is in the permanent collection of the Architecture and Design Department at the Museum of Modern Art (MoMA) in New York City (NYC) and is considered a useful tool that is also art. One of MoMA's curators was browsing products in NYC's Paragon Sporting Goods store and requested a sample. The Architecture and Design Acquisitions Committee reviewed the tool and included it in the collection.

**See Author Info and Works Cited on page 37.**

# The STORY BEHIND The PHOTO

## Announcing the Winter 2023 "Caption This Photo" Contest!

The image to the right caught our attention while sorting through the 1997 Convention photo archives. Then Secretary-Treasurer Jim Froula is waiting for the next delegate to stop by and play "Stump the Secretary."




***How to Enter:*** Send us your witty caption(s) for this photo from Convention archives. If the judges vote yours as one of the top three (and you have not been a previous winner), **we'll send you a ΤΒΠ t-shirt of your choice!**

**DEADLINE: WEDNESDAY, FEBRUARY 1, 2023 5 P.M. (ET)**

Submit your entry using this form: *www.tbp.org/?CaptionSub* or mail to *The Bent* of Tau Beta Pi, Caption Contest, P.O. Box 2697, Knoxville, TN 37901-2697.

Questions? Contact *pat@tbp.org*

## WINNERS of the Fall 2022 "Caption This Photo" Contest:

The judges considered 67 captions received from 37 members for the Fall 2022 contest. Thank you! You can read all entries, including captions and results from recent contests, at: **tbp.org/pubs/captionContest.cfm**.

1ST PLACE:

**"Construction Engineers in Training: One working for every five looking over his shoulder and watching him work."**

Alec G. Richardson, *PA L '87*

2ND PLACE:

**"Froula? Nagel? Does anyone here have any idea who these guys are?"**

Lynn B. Ruskin, *MD B '81*

3RD PLACE:

**"I've been reviewing the IRS regulations and I'm pretty sure we can't claim our Tau Beta Pi tattoos as a business expense."**

Thomas G. Hausheer, *IL B '70*

4TH PLACE:

**"This entry here is from NE Alpha, and theirs simply says 'Ethanol will solve the problem.'"**

James A. Henricks, *AZ A '79*

▲ The Fall 2022 contest image (above) appeared in the December 1979 issue of the *Council Bulletin*. The Awards Committee is engrossed in their work at the 1979 "Cornhusker" Convention at the University of Nebraska.

**CONGRATULATIONS TO OUR WINNERS!**

THE ANNUAL REPORT OF THE

# PRESIDENT

## ADDRESSING CONVENTION: STATE OF THE ASSOCIATION

**MENNA M. YOUSSEF,** Ph.D., *Virginia Gamma '04*
President of the Association through December 31, 2022.

We have gathered here in Knoxville, TN, home of the Association's Headquarters, for Tau Beta Pi's 116th Convention. I am pleased that we are finally convening in person.

I would like to begin by thanking our hosts, the Tennessee Alpha Chapter at the University of Tennessee and the Great Smoky Mountains Alumni Chapter. They, along with HQ, have graciously hosted us, pivoted their plans with last year's cancellation, and provided us with the support needed to conduct the Convention. Their hard work and dedication is much appreciated.

### SPECIAL TRIBUTE

Earlier this year, our dear friend and Tau Bate, Roger Hawks passed away on February 28. Roger was Assistant Executive Director Emeritus of the Tau Beta Pi Association. Inducted into the New York Lambda Chapter class of 1975, he served as Assistant Secretary-Treasurer from 1986-2016, and as Director of Chapter Programs from 2016-18. Roger was the sixth person to hold the position of Assistant Secretary-Treasurer. Throughout those years, many members who interacted with Roger will remember his lightheartedness, genuine smile, and dedication to the Association through his work with the District Program, Convention, and collegiate chapters. I had the privilege to attend my first collegiate inspection with Roger. We offer our sincere condolences to his family. He will be missed.

### INTRODUCTION

The Executive Council (EC) has multiple responsibilities established under the provisions of the Constitution and Bylaws (C&B) of the Association. Among those responsibilities, the Council reports its activities during the preceding year by addressing the Convention with the State of the Association. As Council Chair and President of the Association, this report is presented on behalf of the EC.

In general, we as a Council receive direction from the Convention to guide the programs of the Association. This work is, in turn, carried out by the Executive Director, our dedicated HQ staff, the program directors, and numerous volunteers.

Four committees met virtually at the 2020 *Unvention*. The **Petitions Committee** reviewed and recommended a chapter at Georgia Southern University. The Georgia Gamma Chapter was installed later in the year and their delegate joins us today at the chapter's first Convention. The **Rituals Committee** recommended that we approve the use of the virtual initiation indefinitely. The **Financial Affairs Committee** approved expenses for the 2021 Convention which are in effect for the 2022 Convention. The Computer Science program was approved at NC State University by the **Program Review Committee**. The 2021 Convention was cancelled due to COVID protocols and its business will be conducted at this Convention.

The Association is comprised of 251 active collegiate chapters and 47 active alumni chapters. Collegiate chapters initiated 8,624 members in 2021 and 7,374 members in 2022. As of July 2022, we have initiated 625,275 members. One member was expelled and eleven resigned. This year, WV Alpha at West Virginia University, MO Gamma at Washington University, and MA Beta at Massachusetts Institute of Technology celebrated their 100th Anniversary. IL Alpha at University of Illinois at Urbana-Champaign celebrated its 125th Anniversary.

Petitions from Lipscomb University, Merrimack College, University of Georgia, and Western Carolina University were approved by the EC. The petitioners were visited by inspection teams and reports were submitted to the Petitions Committee for recommended action. In addition, petitions were submitted by Campbell College and Fairfax University. The Association is in the process of scheduling its first two international inspections at Texas A&M in Qatar and American University of Sharjah in the United Arab Emirates. This is an exciting time for us to expand globally.

**The President's Report continues on page 38.**

# Newly Elected Executive Councillors

The 2023 Convention delegates elected three new members to the Executive Council from a field of four candidates to fill the seats of three members whose terms expire on December 31, 2022: Rachel K. Alexander, P.E., *CA U '15*; Russ W. Pierce, *WA A '70*; and George J. Morales, Ph.D., *FL E '06.* The new Councillors will serve the 2023-25 term and join six members elected in 2020, 2021, and 2022. The Executive Council comprises nine Tau Beta Pi alumni who serve staggered terms of three years.

Members of the 2023 Executive Council include:

- Rachel K. Alexander, P.E., *California Upsilon'15*, **who was reelected**;
- Mike J. Hand III, *Michigan Gamma '11,* **who was elected**;
- Ron M. Hickling, *California Epsilon '80*;
- Ming Lin, Ph.D., *New York Gamma '01*;
- Marla A. Peterson, *Arizona Alpha '83,* **who was elected**;
- Mike L. Peterson, *Iowa Alpha '89*;
- Joan M. Sciacca, *California Mu '87*;
- George Youssef, *New Jersey Gamma '01*;
- Menna M. Youssef, Ph.D., *Virginia Gamma '04*

Our thanks to the fourth candidate, Chetan G. Date, Ph.D., P.E., *Arizona Beta '84*, who was not elected.

The new Executive Council have met and elected officers for the upcoming year from among the Council members and will serve for a period of one year. After serving as vice president for one year, the vice president automatically becomes president the following year. The officers for 2023 include: President Rachel Alexander, Vice President Ron Hickling, Secretary Mike Peterson, and Treasurer Mike Hand. Executive Director Curtis D. Gomulinski serves as a non-voting member of the Council.

Current, past, and future members of the Executive Council together at the 2022 Convention.

## RACHEL ALEXANDER P.E.

CALIFORNIA UPSILON '15

Rachel is employed as a civil engineer by the Sacramento County Department of Airports which operates and maintains four airports, including Sacramento International.

She has a B.S. degree in civil engineering from California State University, Sacramento, where she served as CA Upsilon Chapter president and is currently a CA U Chapter Advisor.

Rachel is a registered professional engineer in California and previously served as president for the Sacramento Valley Alumni Chapter. She was elected to the TBΠ Executive Council in 2019 and has served the Association as Secretary (2020 & 2021) and vice president (2022).

## MICHAEL HAND III

MICHIGAN GAMMA '11

Mike works at Ford as an autonomous vehicles systems engineer, was initiated by MI Gamma in 2009, and has been involved in leadership and volunteer roles ever since.

Mike has B.S. & M.S. degrees in EE and electrical engineering systems from the University of Michigan, where he served as MI Gamma Chapter president and Advisor.

Mike helped establish the Ann Arbor Alumni Chapter, and in 2020 was instrumental in planning and executing the virtual *Unvention*. He has attended every Convention since 2011 and currently assists chapters by serving as a District 7 Director.

## MARLA PETERSON

ARIZONA ALPHA '83

Marla is a senior technical manager for Continuous Improvement. She has been dedicated to aerospace product excellence for 38 years, serving in leadership positions for over 25 years at various levels.

She earned a B.S. in systems engineering from the University of Arizona, where she served as AZ Alpha Chapter vice president for two years.

Marla is a founding member of the Engineering & Technology Diversity Council and Women in Honeywell network and continues to mentor and sponsor interns, new hires, and experienced women in aerospace.

# 2022 TAU BETA PI CONVENTION


## SUMMARY OF ACTIVITIES AND BUSINESS FROM THE 2022 CONVENTION

The 116th Convention of Tau Beta Pi was held September 28 to October 1, 2022, in Knoxville, TN, home to Tau Beta Pi Headquarters. There were 333 members representing 197 collegiate chapters and 23 alumni chapters on behalf of the entire organization. The total included 271 students, 40 alumni, plus 22 chapter advisors. An additional 95 non-member guests, recruiters, volunteers, and consultants participated in Convention activities.

Because of COVID-19, this was the first in-person Convention since 2019. A virtual *Unvention* was held in 2020 and the 2021 event was cancelled. Business for two years was conducted and Association awards from 2020-22 were presented.

The Tennessee Alpha and Great Smoky Mountains Alumni Chapters hosted the Society's annual meeting. **Christian T. Isaacs,** *TN A '22*, served as Arrangements Chair and led the host committees in such duties as the model initiation, Headquarters tour, and volunteer coordination, with much support from the Great Smoky Mountains Alumni Chapter.

Headquarters for this Convention was the Knoxville Convention Center (KCC), located in the picturesque World's Fair Park, site of the 1982 World's Fair. Four Business Meetings, Committee and District meetings, Professional Development and ICE Sessions, and a Recruiting Fair were held at the KCC. A tour of ΤΒΠ Headquarters, Model Initiation, and the Convention group picture took place on the adjacent University of Tennessee campus. Members and guests shared the Convention information, maps, agenda, and networking opportunities through the Guidebook app.

The Association treated the students to a social and dinner on Wednesday evening prior to the start of Convention, at the iconic Sunsphere, built for the World's Fair.

The President's Report for the Executive Council was presented by **President Menna M. Youssef, Ph.D.,** *VA Γ '04*, at the First Business Meeting on Thursday. **[See page 12]** A corporate and graduate program Recruiting Fair, including 28 companies and 31 engineering graduate programs, took place during the morning and afternoon, in tandem with Professional Development Sessions, HQ tour, and professional headshots. A smaller virtual Recruiting Fair was offered on September 22. The list of all recruiters is presented to the right (page 15). The evening's banquet honored the 2020 and 2021 Laureates. **Michael L. Peterson**, ΤΒΠ Secretary, introduced

the keynote speaker, **Carl J. Kirpes, P.E.,** *IA A '12*; President and Managing Partner at KT Pacer, and a 2012 TBΠ Laureate for diverse achievements.

Friday's Advisor and Mentor Banquet included the presentation of the 2020-22 Outstanding Advisor awards, recognition of the 2020-22 McDonald Mentors, as well as presentation of the 2021 Distinguished Alumnus award to one of the five recipients, **James A. Momoh, Ph.D.,** *DC A '75*. Chapter Excellence and Chapter Project Awards were presented and service anniversaries for TBΠ volunteers and HQ staff were recognized.

The Alumni and Chapter Awards Banquet on Saturday brought Convention business to a close with an abundance of activities. The Final Business Meeting was held as well as recognition of the 2020-22 Distinguished Alumni, along with winners of the J.D. Froula Most Improved Membership Award, the R.H. Nagel Most Improved Chapter Award, and the R.C. Matthews Outstanding Chapter Awards. Following the Resolutions Committee presentation, Executive Council service as well as the new Executive Councillors were recognized. The Convention was adjourned with a rousing rendition of the Tau Beta Pi yell.

## TAU BETA PI LAUREATES

At Thursday's Laureate Banquet, Executive Councillor Ron M. Hickling introduced the Laureates of the past two years: 2020 Laureates **Kevin Ptak,** *SD A '19*, for athletics; and **Natalie J. Turco,** *NY Σ '20*, for diverse achievements; and 2021 Laureates **Kara L. Combs,** *OH M '21*, for service; **Carissa G. Dopman,** *NY Σ '21*, for achievements in the arts; and **Tyler A. Kleinsasser,** *SD A '19*, and **Michael Ustes,** *MI I '22*, for diverse achievements Each Laureate received a commemorative plaque and $2,500 check. No Laureates were selected in 2022.

## TAU BETA PI-MCDONALD MENTOR

**Asad M. Madni, Ph.D., C.Eng.,** *CA E '69*, was honored (in absentia) with the 2022 McDonald Mentor Award. He received $1,000, a bronze engraved medallion, a replica lapel pin, and $1,000 will be given to the nominating chapter at UCLA (California Epsilon).

## OUTSTANDING ADVISOR

The Friday Awards Banquet recognized the 2022 Outstanding Advisor **Monica M. Burdick, Ph.D.,** *NY K '98*, Associate Professor at Ohio University, who was presented with $1,000 and another $1,000 for the university's discretionary fund. **Amy L. Kaleita, Ph.D., P.E,** and **Sue L.R. Holl, Ph.D.,** were recognized as the 2020 and 2021 Outstanding Advisors, respectively.

## DISTINGUISHED ALUMNUS

The Saturday Awards Banquet recognized the 2020-22 Distinguished Alumni. Awardees in attendance included 2020 recipient **Paul D. Plotkowski, Ph.D.,** *MI Θ '80;* and 2021 recipient **Richard J. Spontak, Ph.D.,** *PA B '83*. The 2022 Distinguished Alumnus Awards were presented (in absentia) to **Makola M. Abdullah, Ph.D.,** *DC A '90*, and **Katherine L. Bouman, Ph.D.,** *MI Γ '11*. Each Distinguished Alumnus received an engraved plaque and a $2,000 scholarship in each Distinguished Alumnus' name was awarded to TBΠ students for the 2022-23 academic year.

## CHAPTER & PROFESSIONAL DEVELOPMENT

The Chapter Development Program included Interactive Chapter Exchanges (ICE) and district meetings. Each district met three times during Convention and General and Focus ICE Sessions were offered on Friday. A Professional Development Program was presented on the topics of career development and leadership. Eleven sessions were available and included the following titles: "Constructive Conflict," "Robert's Rules of Order," "How to Target Your Resume," "Personal Finance for New Grads," "Professional Licensure and Certification," "Rock Your Resume," "Preparing and Deciding When to Go to Grad School," "The Academic Career Path," "Leadership Life Lessons: How to Motivate, Teach, Coach, and Influence Both Yourself and Others," "New Engineering Solutions for Tomorrow," and "Graduate Fellowships."

## 2023-25 EXECUTIVE COUNCILLORS ELECTED

Four candidates, introduced in the Fall 2022 issue of *The Bent*, ran for the opportunity to serve on the Executive Council. The Convention elected three members

## A SPECIAL THANKS TO OUR RECRUITERS

We gratefully acknowledge the 2022 Recruiting Fair participants:

### PLATINUM LEVEL

Lehigh University
Stevens Institute of Technology
University of Pittsburgh
Swanson SOE

### GOLD LEVEL

AMS Corporation
Bechtel Corporation
CISCO
DENSO
Epic
General Dynamics Electric Boat
The George Washington University SEAS
Institute for Defense Analyses
Kansas City NSC (Managed by Honeywell FM&T)
Northeastern University
Lockheed Martin
MIT Leaders for Global Operations
Oak Ridge National Laboratory
PEPSICO Beverages North America
Purdue University COE
Raytheon Technologies
Sandia National Laboratories
The University of Tennessee
Oak Ridge Innovation Institute
University of Virginia Engineering
US Cellular

### SILVER LEVEL

BAM, Inc.
Clayton Homes
Columbia University
Electric Power Research Institute
Forcum Lannom
Iowa State University
Lisega Inc.
Michigan State University
Michigan Technological University
New York University Tandon SOE
Northwestern University SEAS
NSK Steering Systems Americas
The Ohio State University
The Pilot Company
Rensselaer Polytechnic Institute
RJH Consultants, Inc.
Texas Instruments
University of Florida
University of Kentucky COE
University of Southern California Viterbi School of Engineering
University of Texas at Dallas
Vanderbilt University
Virginia Commonwealth University
Vogt Power International
Wayne State University COE
Worcester Polytechnic Institute

to fill the vacancies and serve the 2023-25 term. Results are reported on **page 13**.

## COMMITTEES

Convention business was handled by thirteen standing and *ad hoc* committees with collegiate and alumni chapter voting delegates serving on one of the following committees: **Advisors**; **Alumni Chapters**; **Awards**; **Chapter & Association Financial Affairs**; **Constitution and Bylaws**; **Convention Site**; **Diversity, Equity & Inclusion** (DEI); **Image and Marketing**; **New Engineering Solutions for Tomorow** (NEST); **Petitions**; **Program Review**; **Resolutions**; and **Rituals**.

## CONSTITUTION AND BYLAWS

The motion that Article XI, Section 5 of the Constitution be amended to include a Director of the District Program as one of five Program Directors passed. The committee included a brief job description and duties. After much debate, proposals to change Junior eligibility for membership and determining eligibility by engineering program did not pass.

## NEW CHAPTERS GRANTED

The Petitions Committee considered four petitions for new TBΠ chapters and granted charters to Tau Beta Gamma at the University of Georgia, Merrimack College Engineering Honor Society at Merrimack College, Tau Beta Psi at Western Carolina University, and Lipscomb Engineering Honor Society at Lipscomb University. The petitioners had been visited by inspection teams and reports were submitted to the Petitions Committee for recommended action. The chapters will be installed in February and March of 2023. In addition, petitions were submitted by Campbell College and Fairfax University.

## FINANCIAL AFFAIRS

The committee reviewed delegate expenses for the 2022 Convention, chapter accounts receivable to HQ, and the Executive Director's report for 2019-2020. No unusual delegate expenses were found and the 15 chapters with balances over $500 were contacted. A review of the level of allowable expenses for Conventions resulted in a motion to standardize the reimbursement amount to adjusted rates based on the US General Services Administration (GSA), which was approved.

A proposal came from the Trust Advisory Committee to amend Constitution Article XIII, Association Finances, Section 8. Investments Options to include Private Equity Funds representing multiple Private Equity Fund Managers. The motion passed to amend the Constitution subject to ratification by the chapters.

## RESOLUTIONS

Convention approved the appointment of **Ron Hickling,** *CA E '80*, to take the place of **Scott Fable,** *CA T '96*, on the Executive Council (EC). Fable had resigned from the EC.

A voice vote also approved a proposal that EC members whose terms expire in 2021/22/23 would have their terms extended by one year to 2022/23/24. This followed the cancellation of the 2021 Convention, so no EC election was held. A motion to permit ranked choice voting as a procedure for EC elections with a "no confidence" option was approved. The committee also presented a skit during Saturday's Awards Banquet.

## RITUALS

The Rituals Committee reviewed a number of proposals which included modifying some language in the Ritual, permitting hybrid initiations where some initiates are at remote locations, making the motto and Ritual public, and changing the process for modifying the Ritual.

The committee took no further action on making the motto and Ritual public. The committee agreed on changing a part of the Ritual with text to make it more welcoming to everyone.

The committee organized the Model Initiation ceremony which included 44 initiates; 36 from TN Alpha and two from each of the new chapters, GA Delta, MA Kappa, NC Eta, and TN Eta.

## CHAPTER AWARDS

The R.C. Matthews Outstanding Chapter Award for 2021-22, the highest honor for a collegiate chapter in Tau Beta Pi, went to Florida Alpha at the University of Florida. Two honorable mentions were presented: Ohio Kappa at the University of


Above: 2022 Convention Swag.

Left: Convention hosts (left to right) TN Alpha president Derrick Bailey IV; TN Alpha vice president Christian E. White; and Great Smoky Moutains Alumni Chapter past president Donna R.H. Riggs, P.E.

Akron and Texas Alpha at the University of Texas at Austin. The 2020-21 winner was also recognized: Michigan Gamma at the University of Michigan and the honorable mention California Psi at the University of California, San Diego. The R.H. Nagel Most Improved Chapter and the J.D. Froula Most Improved Membership Award for 2021-22 were presented to Massachusetts Theta at the University of Massachusetts Lowell. An honorable mention for Most Improved Chapter went to Texas Alpha at the University of Texas at Austin, and honorable mentions for Most Improved Membership went to California Alpha Alpha at Cal State University, Chico; Florida Beta at the University of Miami; and Ohio Iota at Ohio Northern University. The 2020-21 R.H. Nagel award was presented to California Alpha Beta at the University of California, Riverside with honorable mention going to California Eta at San Jose State University. The 2020-21 recipient of the J.D. Froula award was given to Delaware Alpha at the University of Delaware with the honorable mentions awarded to Missouri Beta at the Missouri University of Science & Technology and Texas Gamma at Rice University.

## FUTURE CONVENTION

The Convention Site Committee reviewed information from six cities to host the 2025 Convention. Members considered factors including cost, convenience of travel, local attractions, weather, safety, free WiFi, and choice of dates. Candidates included Albuquerque, NM; Baton Rouge, LA; Chicago, IL; Little Rock, AR; Minneapolis, MN; and St. Louis, MO. After careful consideration, the proposal to host the 2025 Convention in Albuquerque, NM, was accepted.

Delegates vote on a resoltion during one of the Business Meetings.

The committee approved holding the 2022 in person Convention in Knoxville, TN, and approved holding the 2023 and 2024 Conventions in Atlanta, GA, and Rapid City, SD, respectively.

## OTHER BUSINESS

The *ad hoc* **Alumni Chapters Committee** was assigned to review and recommend changes to the operations and activities of

Continues on page 43.

# Tau Beta Pi Student Advisory Board

The Student Advisory Board member **application is now open!** Consider expanding your Tau Beta Pi involvement to serve a three-year term from March 2023 thru February 2026. To be eligible, applicants must either be current undergraduate or graduate students or within one year of graduating from their most recent degree. **Applications are due January 31, 2023**.

If you have any questions, feel free to reach out at: *sab.officers@tbp.org*.

SAB members at the 2022 Convention Career Fair.

Application link: *https://tinyurl.com/SABApp23*

SAB web page: *www.tbp.org/?SAB*

# Chapter Awards

FL Alpha members: Griffis and Sweeney with Awards Committee members Jared Welch, *NY B '23* (far left), and Donovan Vincent Jr., *NY X '23* (far right).

**OUTSTANDING CHAPTER AWARD:**

## Florida Alpha

The Florida Alpha Chapter at the University of Florida received the 2021-22 R.C. Matthews Outstanding Chapter Award — the sixth time to achieve this honor since 1982.

Florida Alpha was selected for its outstanding effort in community service and member involvement that impressed the Awards Committee in a number of ways. The committee found the quality and variety of projects to be exceptional and stated "it was clear that your members, institution, and especially your community benefited from the service. In addition, the chapter's year-round commitment to the GatorTRAX program and STEM activities for K-12 students was extremely impressive. With frequent initiate and member events such as billiards night, baking tutorials, and our favorite — Bent polishing — it is no wonder you are able to maintain a robust and exceptional chapter."

FLORIDA ALPHA CHAPTER LEADERS (2021-22):

President – **Baleigh D. Sweeney, *FL A '23***
Vice President – **Brendan A. McCue, *FL A '22***
Treasurer – **Calvin Fai, *FL A '20***
Recording Secretary – **Quinn R. Hardy, *FL A '23***
Corresponding Secretary – **Trevor A. Richardson, *FL A '23***

FLORIDA ALPHA CHAPTER ADVISORS (2021-22):

**Michael W. Griffis, Ph.D., *FL A '85* (*Chief*)**
**John D. Abbitt III, Ph.D., *VA A '85***
**Curtis R. Taylor, Ph.D., *AR A '01***
**Meghan C. Ferrall-Fairbanks, Ph.D., *FL A '12***

**HONORABLE MENTIONS** — Outstanding Chapter Award
**Ohio Kappa** (University of Akron)
**Texas Alpha** (University of Texas at Austin)

## Chapter Excellence Awards 2021-22

**Executive Director Curt Gomulinski recognized these chapters to mark excellence in their performance in seven areas. Chapters with distinction, scoring 100 percent or more, are in bold:**

Alabama Alpha
Alabama Delta
**Alabama Epsilon**
Arizona Alpha
**California Gamma**
California Eta
California Alpha Delta
Colorado Beta
DC Alpha
**Florida Alpha**
Florida Gamma
Florida Delta
**Illinois Alpha**
**Indiana Alpha**
**Iowa Alpha**
**Massachusetts Theta**
**Michigan Eta**
Michigan Epsilon
**Minnesota Alpha**
Mississippi Beta
**Nevada Beta**
**New Jersey Alpha**
New York Omicron
Ohio Beta
**Ohio Gamma**
Ohio Delta
**Ohio Eta**
**Ohio Iota**
**Ohio Kappa**
**Ohio Lambda**
**Ohio Nu**
**Ohio Xi**
Oklahoma Gamma
Oregon Alpha
Pennsylvania Beta
**Pennsylvania Zeta**
**Texas Alpha**
**Texas Zeta**
Virginia Delta
Wisconsin Alpha

Tau Beta Pi
The Engineering Honor Society

# 2022 Convention

SEE PAGES 40-41 FOR THE 2020-21 CHAPTER AWARDS ALSO PRESENTED AT THIS YEAR'S CONVENTION.

Awards Committee Chair Owen Convery, *CA S '23* (far left) with MA Theta officers: (left to right) Philpot, O'Rourke & Kansagara.

Members of the MA Theta Chapter handed out water to runners at the 2022 Boston Marathon.

**MOST IMPROVED CHAPTER AWARD & MOST IMPROVED MEMBERSHIP AWARD:**

## Massachusetts Theta

The Massachusetts Theta Chapter at the University of Massachusetts Lowell was selected as recipient of the 2021-22 R.H. Nagel Most Improved Chapter Award.

*The 1971 Convention established this award to recognize major improvement in chapter development, including project work and reports to HQ, in one year as compared with previous years.*

The Massachusetts Theta Chapter was also selected as recipient of the 2021-22 J.D. Froula Most Improved Membership Award.

*In 2011, the Executive Council established an annual Most Improved Membership Award to recognize chapters for increased membership over a three-year period.*

The Awards Committee stated the selection of the MA Theta Chapter to receive these prestigious awards was based on "an increase in the quality and quantity of chapter projects, resulting in an overall Chapter Excellence grade change of an additional 80 points between 2019 and 2022. Grades are generated using weighted scales provided by HQ which incorporates initiations, projects, finances, membership, and more. Secondly, we are even more impressed by the continuity and commitment involved in your ongoing projects such as meetings, fundraisers, and professional development nights. Finally, the overall participation and membership of your chapter has improved significantly." Congratulations on this outstanding progress and for serving as an example for other ΤΒΠ chapters. Information on MA Theta's chapter projects can be found in this issue on pages 20-21.

MASSACHUSETTS THETA CHAPTER LEADERS (2021-22):

President – **Emily B. Philpot, *MA Q '22***

Vice President – **Rohan Kansagara, *MA Q '24***

Treasurer – **Connor F. O'Rourke, *MA Q '22***

Recording Secretary – **Sarah G. Chennankara, *MA Q '23***

MASSACHUSETTS THETA CHAPTER ADVISORS (2021-22):

**Kari D. White, Ph.D., *MA Q '03 (Chief)***

**Edward L. Hajduk, Ph.D., *MA Q '95***

**Corey Shemelya, Ph.D., *MA Q '08***

**HONORABLE MENTION** — Most Improved Chapter Award **Texa Alpha** (University of Texas at Austin)

**HONORABLE MENTIONS** — Most Improved Membership Award: **California Alpha Alpha** (Cal State University, Chico), **Florida Beta** (University of Miami), and **Ohio Iota** (Ohio Northern University)

# Chapter ⋆ Project Awards

Alabama Delta collaborative Bent paint art board.

Alaska Alpha members participated in UAF's Student Organization Fair.

Florida Alpha members work on the clock tower rennovation project.


TBΠi Day stickers handed out by Massachusetts Theta at their event.

**AL Δ Univ. of Alabama in Huntsville**
9 Projects Created a collaborative art piece with paint filled balloons and prepared Valentine gift baskets for engineering faculty.

**AL E University of South Alabama**
37 Projects Hosted a TBΠ Week which included a Tau Toss (bean bag throw), Beta Battle (dodgeball), and Pi a Professor.

**AK A Univ. of Alaska Fairbanks**
8 Projects Volunteered monthly with the local food bank and conducted a full bylaws revision, the first for the chapter since its inception.

**AR A University of Arkansas**
45 Projects Conducted events to clean up the greenway surrounding Lake Fayetteville and hosted multiple campus-wide blood drives and Mental Health Q&A panels.

**CA A Univ. of California, Berkeley**
90 Projects Held an officer retreat at a cabin near Yosemite and engaged with other student groups to host a Poker Night and Escape Room trip.

**CA Ψ Univ. of California, San Diego**
71 Projects Hosted an ice skating fundraiser and a bonfire on the beach to welcome members back to campus after a year of virtual instruction.

**CA AΓ San Francisco State Univ.**
15 Projects Held a resume workshop and mock interview workshop and a cooking event to teach members how to cook dishes such as veggie pasta, arugula salad, and banana bread.

**FL A University of Florida**
59 Projects Led an effort to renovate a campus clock tower including reverse engineering the original technology and conducted a volleyball tournament social.

**FL Δ University of Central Florida**
59 Projects Held a Surviving Engineering event to engage freshmen and hosted an event with FL Iota which included a scavenger hunt at Disney Springs.

**IA A Iowa State University**
131 Projects Hosted annual Pi Mile Run fundraiser and Roller Coaster Competition for middle and high schoolers in a Rube Goldberg format.

**IL A Univ. of Illinois at Urbana-Champaign**
26 Projects Traveled to a local state recreation area to remove invasive plant species and held a tech talk with an aerospace company.

**IL B Illinois Institute of Technology**
14 Projects Organized a Halloween scavenger hunt for members around campus and held an alumni networking panel with career paths insight.

**IL Δ Bradley University**
14 Projects Engaged with the local Boy Scouts and Cub Scouts for a 4-floor egg drop and held an annual pumpkin painting event for electees.

**MA Θ Univ. of Massachusetts Lowell**
25 Projects Volunteered at the Boston Marathon passing out waters and held Pi a Professor fundraiser on Pi Day with stickers.

**MD B University of Maryland**
53 Projects Operated concession stands at several university athletic events to raise funds and held a Bent shining BBQ on campus.

**MI Γ University of Michigan**
150 Projects Held several park cleanup days to improve nature areas for local wildlife and hosted multiple companies for info sessions.

**$4,500 in Scholarships will be awarded to nine chapters that received Chapter Project**

Alabama Epsilon
Arkansas Alpha
California Psi
Iowa Alpha

At the 2022 Convention, **Chapter Project Awards** for outstanding performances during 2021-22 include:

**MI Ε Wayne State University**
35 Projects Visited an archery range for members to learn to shoot and hired a professional photographer for a headshot fundraiser for students.

**MI Ι Univ. of Michigan-Dearborn**
23 Projects Built a Google Site to centralize the candidate application process and delivered a monthly newsletter to the chapter members with requirements and events.

**NV Β Univ. of Nevada, Las Vegas**
13 Projects Attended "Introduce a Kid to Engineering Day," leading the creation of penny launchers activity, and hosted a Bob Ross Night.

**NY Η City College of CUNY**
11 Projects Wrote letters to those visiting the NYC Food Bank for Thanksgiving and collaborated with a local middle school to talk about engineering and computer science.

**NY Ο SUNY at Stony Brook**
21 Projects Hosted a speed friending event to kick off the semester and updated the painted rock on campus with ΤΒΠ's name and Bent.

**NY Σ Alfred University**
11 Projects Prepared envelopes with a wax seal for eligible students and held a Rollbook Update to move signatures from online to the rollbook.

**OH Ι Ohio Northern University**
35 Projects Hosted Marathon Petroleum to discuss career opportunities and held multiple class tutoring sessions to support underclassmen.

**OH Κ University of Akron**
35 Projects Volunteered to clean up the university's soccer stadium and held a Best Bent competition for electees using crafts.

**OH Λ Youngstown State University**
12 Projects Hosted a shared event with the Ohio North Coast Alumni Chapter at Top Golf and held an end of finals celebration to decompress.

**OK Α University of Oklahoma**
34 Projects Offered an Underclassman of the Year Award to raise awareness of the chapter and wrote Valentine cards for local hospitals.

**PA Β Pennsylvania State University**
25 Projects Participated in a tour of the campus' nuclear research reactor and held multiple blood drives, study nights, and Bent polishing sessions.

**PR Α University of Puerto Rico**
29 Projects Hosted a "How to apply for ΤΒΠ Scholarships" session and held a Personal Finances Workshop to prepare members post-graduation.

**SD Α South Dakota School of Mines & Tech.**
14 Projects Invited ΤΒΠ alumni to campus to discuss career paths and hosted a professional headshot event with the student government.

**TN Α University of Tennessee**
20 Projects Worked with a local nonprofit to prepare toiletry items and clothing for new mothers and held annual Tau Bagel Pi breakfast.

**TX Α University of Texas at Austin**
148 Projects Invited university faculty to lead fireside chats and rented kayaks and paddleboards for members and electees to get to know each other on the water.

**WI Α Univ. of Wisconsin-Madison**
70 Projects Partnered with Occupaws (provides guide dog training) on fundraisers and held a Senior Send-Off dinner to recognize graduates.

**Awards for at least three consecutive years. Each chapter will receive $500.**

Maryland Beta
Michigan Gamma
Ohio Kappa
Tennessee Alpha
Texas Alpha

New York Eta members in a grad photo together around the Bent monument.


New York Sigma members at the ΤΒΠi Day bake sale fundraiser.


Ohio Lambda gave out mini pies on ΤΒΠi Day to increase chapter awareness.

Oklahoma Alpha members doing the ΤΒΠ photo challenge.

**THIS IS THE TWELFTH IN A SERIES OF ARTICLES THAT INVESTIGATES THE HISTORY OF SCIENCE AND ENGINEERING.**

*One way in which this history has been preserved is in the names of the scientific units that we commonly use. Those units will serve as starting points for these articles as we explore "Why do we call it a...?"*

By: ***Lyle D. Feisel**, Ph.D., P.E. (ret.), Iowa Alpha '61*

## WHY DO WE CALL IT A...

# HERTZ

One of the pleasures — and sometimes annoyances — of living in a retirement community is occasionally hearing the phrase, "Well, I remember when I was a child ..." followed by a tale of some interest, albeit occasionally of doubtful veracity. I'm going to exercise that privilege of old age today by saying that when I was a student, frequency was measured in cycles per second (cps). Indeed, it was common to simply drop the last two words and say, "I tuned the radio to 1.1 megacycles." About 1960, however, the establishment decided to catch up with the International Electrotechnical Commission and start using the hertz as a measure of frequency instead of cycles per second. Much to the relief of the linguistic purists, we then started saying, "I tuned the radio to 1.1 megahertz." A hertz is defined as one cycle per second and is the unit of frequency for alternating electrical signals, mechanical vibrations, sound, and any other oscillatory phenomenon. It is named for Heinrich Hertz (1857–94), a German physicist of some renown. He led a short but productive life.

Heinrich Rudolf Hertz was born on February 22, 1857, in Hamburg. The city was then a city-state in the German Confederation, a rather loose association of small German-speaking monarchies that existed before the modern German state was formed. Like many — but not all — men and women who excelled in science in the early years, Hertz was born into a family that had the wherewithal to provide opportunities for education. His father was an attorney and legislator, and his paternal grandfather was a wealthy Jewish businessman who had converted to Christianity when he married into a Lutheran family. More about that anon.

In 1863, at the age of six, Hertz was enrolled in a private school for boys in Hamburg where he studied until he was fifteen. I presume the curriculum was mostly devoted to the three Rs, but there must have been an introduction to science as well.

In the mid-nineteenth century, a student had to pass examinations in Greek and Latin to gain entry to university. Hertz had neglected those subjects, so when he decided that he would like to go to university, Hertz spent two years learning the languages while studying at home. He then enrolled in the Johanneum

Gymnasium, a private high school founded in 1529 and still operating today.

After a year at the Johanneum and a brief flirtation with architecture, Hertz decided that he wanted to be an engineer and started on an educational odyssey that took him to several universities around Germany. He worked with various scholars of note including Helmholz and Kirchhoff and served for some years as an assistant to Helmholz. His education was interrupted when he was about 20 years old, and was "volunteered" to spend a year in the army.

Hertz was a brilliant scientist/engineer and was especially recognized as an experimentalist. He would study theory during the day and then work on physical experiments in the evening. His most noted achievements were associated with his laboratory techniques.

About 1880, the Philosophy Department of the University of Berlin offered a prize for anyone who could determine whether an electric current possessed mass and hence kinetic energy. The arrangement was not unlike the Xprizes that we have today. Hertz was working for Helmholz at the time and Helmholz assigned to him the task of answering the question. Hertz devised and conducted some very sensitive experiments and determined that if current did have mass, it was exceedingly small. Some 20 years later, J.J. Thomson discovered the electron, which is, of course, the carrier of electric current. It has a mass of about $10^{-30}$ kilograms which is, indeed, exceedingly small and presumably beyond the range of Hertz's experiments.

Hertz made a number of contributions to scientific knowledge, but the one for which he is most famous — and for which he is honored through the naming of a physical unit — is the first systematic observation of electromagnetic radiation. In 1865, British physicist, James Clerk Maxwell (1831–71) published a paper showing that alternating electric and magnetic fields are coupled and that they propagate through space at the speed of light. He also proposed that light was actually an electromagnetic wave. It is all well and good to make such predictions but, as with many good theories, they had to wait a few years for laboratory experiments to demonstrate their validity.

In 1885, Hertz was appointed Full Professor of Experimental Physics at the University of Karlsruhe and intensified his attention to the problem of electromagnetic radiation. While experimenting with electric discharges into a spiral coil, he observed that sparks were created in the corresponding gap in another similar coil. Suspecting that this might be due to the electromagnetic radiation predicted by Maxwell, he embarked on a series of experiments to better understand the phenomenon.

I have long been intrigued by the fact that we usually report only our successes and rarely trouble the community with tales of the things that did not work. It would be interesting to know how many different experimental arrangements Hertz tried before he designed and built the apparatus that finally succeeded. There must have been many. An electric spark is a noisy, messy event, consisting of a broad spectrum of currents flowing back and forth. To generate a coherent signal, Hertz needed to construct a resonant circuit that would select a narrow range of oscillations and suppress all the others. He ended up building a capacitance-loaded dipole antenna at a time when those words had no meaning to anyone. But he did it and it worked. He then used a coil with a spark gap to detect the wave he generated. Q.E.D.

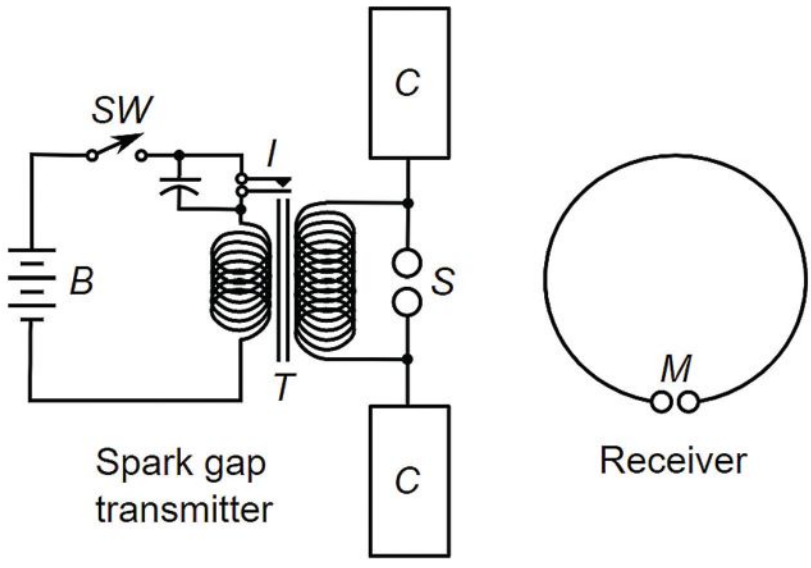
Hertz went on to explore electromagnetic radiation at length, demonstrating polarization of the waves and showing that they propagated at the speed of light. Even though he couldn't explain it, he also demonstrated the photoelectric effect by observing that a capacitor discharged faster when it was exposed to ultraviolet light.

Hertz was married in 1886 and he and his wife, Elizabeth, had two daughters. Eight years later, in 1894, he developed an infection and died as a complication of surgery. He has no living descendants.

There is an interesting sequel to the Hertz story. You will recall that Heinrich's grandfather was a Jew who had converted to Christianity when he married. That conversion wasn't good enough for Hitler's Nazis. They tried — unsuccessfully — to eliminate the hertz as a unit and substitute the helmholz, still abbreviated Hz. They also harassed Heinrich's wife and daughters until they left Germany and migrated to Great Britain.

So, long after his death, Heinrich Hertz still excited both admirers and detractors. In his short life, he made many contributions to science, but he is best known for his work proving that high frequency electromagnetic waves propagate through space. That frequency needs to be measured and that measurement needs a unit and that's why we call a hertz a hertz.

Diagram of the Hertz transmitter and receiver.



# BRAIN TICKLERS

## Results From Summer

**Perfect Scores**

| | | | |
|---|---|---|---|
| *Couillard, J. Gregory | IL | A | '89 |
| Etz, Stephen P. | NJ | B | '90 |
| Etz, Peter | Brother/Son of member | | |
| Gaston, Charles A. | PA | B | '61 |
| *Gibbs, Kenneth P. | MO | Γ | '76 |
| *Mayer, Michael A. | IL | A | '89 |
| *Norris, Thomas G. | OK | A | '56 |
| Parks, Christopher J. | NY | Γ | '82 |
| *Slegel, Timothy J. | PA | A | '80 |
| Wilkinson, Timothy S. | WA | A | '84 |

**Other**

| | | | |
|---|---|---|---|
| *Bannister, Kenneth A. | PA | B | '82 |
| Bertrand, Richard M. | WI | B | '73 |
| Garliauskas, Riley M. | MI | Γ | '23 |
| Goodrich, Robert W. | CA | B | '81 |
| Grewal, Kalwant S. | TX | H | '73 |
| *Griggs Jr., James L. | OH | A | '56 |
| Kimsey, David B. | AL | A | '71 |
| Lalinsky, Mark A. | MI | Γ | '77 |
| Loretz, Richard A. | NY | P | '79 |
| Pendleton III, Winston K. | MI | Γ | '62 |
| Penkala, Stanley J. | PA | Δ | '65 |
| Riedesel, Jeremy M. | OH | B | '96 |
| Rubin, James D. | MI | Γ | '82 |
| Schmidt, V. Hugo | WA | B | '51 |
| Skowronski, Victor J. | NJ | A | '71 |
| *Spong, Robert N. | UT | A | '58 |
| Spring, Gary S. | MA | Z | '82 |
| *Upshur, John I. | VA | A | '83 |
| Voellinger, Edward J. | Non-member | | |
| Walleshauser, Benjamin | NY | Θ | '22 |

*Denotes correct bonus solution

## Summer Review

Problem 1 (Tea Party Walkabouts) was the most missed; the judges felt this was likely because readers limited the move choices to just 3, 6, and 9 places and overlooked the phrase "as many threes as you like." Problem 5 (Ladder Locations) only had ⅔ correct answers. Many of the submitted (but incorrect) solutions were close to being right, but missed meeting one of the numerous constraints in the problem. The Bonus had less than 50 percent correct answers. Problem 2 (Goals Scored) was clearly the easiest. Only three submissions were incorrect, each of those missed only one of the two parts.

## Fall Answers

**1:** From first to fifth, the order of merit is **CABED**. If A were telling the truth, B were lying, there would be 25 possibilities, and C would have to distinguish, given he knows his own position. Since C was able to deduce the answer, we must assume that C knows A is a liar and B tells the truth. This yields only two solutions: BAD?? and ?AB?D. In order to deduce the answer, C could not have been in fourth. We are given that C is not fifth, so he must have been first and the correct order of merit CABED.

**2:** The door that must be nailed shut is **Door C**. One possible path has Uncle Don starting in the lower left room and proceeding through doors I, G, F, A, B, D, E, N, H, J, L, K, and M to end in the lower right room.

**3:** The probability that the dart lands in the described region is **(π−2)/2π ≅ 18.17%**. Due to symmetry, we can simplify our analysis to one quadrant of this dartboard. The desired region is the total area of this portion of the dartboard (π/4) minus two quarter circles of radius 1/2 (each area π/16) minus a square of side 1/2 (area 1/4). The ratio becomes (π/4-2(π/16)-1/4)/(π/4) = (π-2)/2π.

**4:** The dots should be placed at **1/2, 1/2/3, 1/2/4, 1/3, 1/4/5, and 2/3**. Consider the die oriented with the 1 face up and the 3 facing toward you. The 2 opposite the 5 makes a surplus of 3 pips on the right face. The 3 opposite the 4 makes a surplus of 1 pip on the back face. The 1 opposite the 6 makes a surplus of 5 pips on the bottom face. Therefore, we need at least 5 pips on top to balance out top/bottom. But there is no way to arrange those 5 around the 8 possible locations on the edge of the top face to balance the other two constraints, so at least 6 dots are needed. By placing four dots at 1/2, 1/2/3, 1/2/4, and 1/3, it can balance out left/right and front/back. Placing one more at 1/4/5 creates the balance between top and bottom, but it skews the balance to the right and back by one dot. A sixth dot placed at 2/3 exactly cancels this introduced skew.

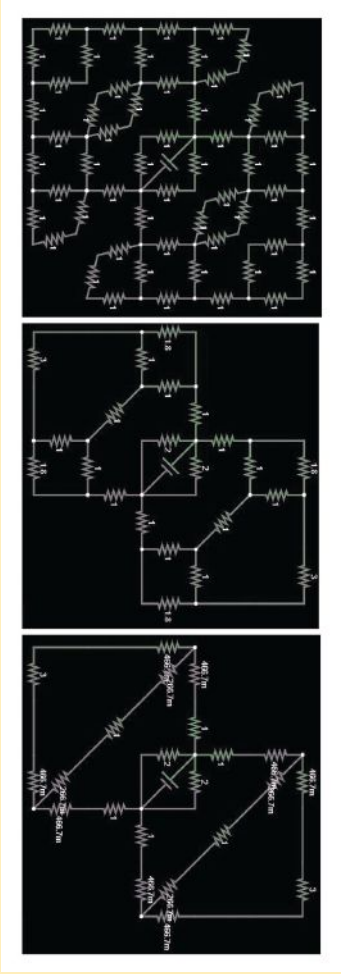
**5:** The solution to the cryptarithm is **160380/972 = 165**. While upon reflection, the S must be a 9 and T must be a 1, it is a challenge to determine the rest of this one by hand. Using a computer helps to identify the three candidates and only one has TWELVE divisible by 12.

## BONUS:

The current for ***N*=1 is 1 A**, for ***N*=2 is 7/5 A,** and for ***N*=3 is 495/331 A**. The case for *N*=1 has two parallel 2Ω paths. This has an equivalent resistance of 1Ω, so the current is 1A. The cases for *N*=2 and *N*=3 can be simplified by employing some symmetry arguments. All main diagonal nodes that do not touch the voltage source will have no current flow across that diagonal line of symmetry. All antidiagonal nodes will also not have current flow across the associated negatively sloped off-diagonal. For *N*=2 then, this results in a circle with parallel branches of 5Ω, 2Ω, 2Ω, and 5Ω resulting in an equivalent resistance of 5/7Ω and a current of 7/5 A. *N*=3 is a little more complicated, but after breaking up the nodes, it looks like the first picture below. Simplification of the circuits gives the second figure. Four Delta-Wye transformations with resulting wye resistances of 7/15Ω, 7/15Ω, and 4/15Ω bring the circuit to a topology

## Fall Answers Continued

shown in the final figure, which can be solved through simple parallel/series equivalent resistances to give an overall equivalent resistance of 331/495Ω, leading to a current of 495/331 A through the voltage supply.



## COMPUTER BONUS:

The largest prime number that contains no repeated digits is **987654103**. An astute solver may have been able to avoid a full-blown program. The number cannot contain all 10 digits as this would be divisible by 9. It must be missing at least one digit, and if exactly one, it cannot be a zero. The largest candidate would be if a 2 is missing and the number ends in 301. The second largest candidate would be if a 1 is missing, and the number ends in 203. Next, would be a 3 missing and the number ending in 201. The next largest candidate would be our solution, so we've reduced the problem to checking primality just four times before we hit paydirt!

## New Winter Problems

Some readers of our column may have heard about the passing of **Howard McIlvried** in late March of 2022. Howard was the lifeforce behind the Brain Ticklers column for over 60 years, from 1958 to 2020. His incredible contributions have delighted (and confounded) thousands of Tau Bates for decades. To acknowledge and honor his achievements, we have dedicated this column to Howard with seven unique and previously unpublished puzzles, all conceived by Howard during his momentous tenure as head judge for the Brain Ticklers column. Happy Tickling!

## 1: Brain Cryptarithm

Solve the following cryptarithm in base 11:

I + LIKE + BRAIN = TICKL + ERS,

where we naturally want the largest possible BRAIN. Standard rules apply: each different letter stands for a different digit, and each different digit is always represented by the same letter; no leading zeros are allowed.

—**Howard G. McIlvried,** *PA Γ '56*

## 2: Chess Rooks

In how many ways can four white rooks and four black rooks be placed (one per square) on a standard chessboard so that no two rooks of different colors threaten each other, *i.e.*, so that a white and a black rook are not both on the same row or the same column.

—**Howard G. McIlvried,** *PA Γ '56*

## 3: Kickoff Hang Time

A football player is about to kickoff with the ball on the 30 yard line. It is well known that if he kicks the ball at an angle of 45 degrees, he will achieve maximum horizontal distance, which for this kicker is 75 yards. However, suppose instead of maximum horizontal distance, he decides to go for increased hang time so that his teammates can arrive at the landing point at the same time as the ball. To at least three significant figures, at what angle (as measured from the ground) should he kick the ball? Ignore any wind resistance, assume his teammates (approximately co-located with the kicker) can run at a speed of 8 yd/sec and that he kicks the ball as hard as he can in the direction of the far goalpost.

—**Howard G. McIlvried,** *PA Γ '56*

## 4: Volleyball Rallies

In the rally point scoring method now widely adopted in volleyball, either team can score a point by winning the rally after a serve, regardless of who serves the ball. The first team to earn 25 points wins the set, except that a team must win by at least two points — that is, if the score is 24-24, then the final score must be 26-24, 27-25, 28-26, etc. Assume two evenly matched teams are playing each other. To at least four significant figures, what is the expected number of rallies (total points scored) per set?

—**Howard G. McIlvried,** *PA Γ '56*

## 5: Ohm Resistance

Consider 30 one-ohm resistors that are connected to form a regular dodecahedron. Orient the dodecahedron so that one pentagonal face is uppermost with one vertex pointing north. What is the resistance between this vertex and the vertex on the bottom face pointing south?

—**Howard G. McIlvried,** *PA Γ '56*

**BONUS:** Consider four numbers, with each having a difference (error) between its actual value and its rounded value (to the nearest integer) that is an independent, uniform, and continuous distribution. What is the exact probability that the sum of the four rounded numbers does not equal the rounded sum (again, to the nearest integer) of the four original numbers.

—**Howard G. McIlvried,** *PA Γ '56*

***BTs continue on page 29.***

AUGUST 1 — OCTOBER 31, 2022

# Alumni Giving

Clarke Club
**Frank T. Dodge**
TN A '60
*"I give so young Tau Bates can start on a great career."*

## Donor Recognition Clubs

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. **THANK YOU** to the 504 TAU BETA PI ALUMNI and others who made donations to the Association totaling $486,397 between August 1, 2022, and October 31, 2022. Gifts received after October 31 do not appear here but will be published in the Spring 2023 issue. These club names and amounts, updated by the ΤΒΠ Executive Council, are set at the following levels:

### $1 MILLION+
**Williams Club**
Edward H. Williams Jr., Sc.D.
*PA A 1875*, Founder of Tau Beta Pi

### $500,000+
**Heikes Club**
Irving A. Heikes, *PA A 1885*
1st student member

### $250,000+
**Harelson Club**
Katharine C. Harelson, *KY A 1924*
1st Women's Badge (WB) recipient

### $100,000+
**Matthews Club**
R.C. "Red" Matthews, *IL A 1902*
1st Sec.-Treasurer of ΤΒΠ

### $50,000+
**Franklin Club**
Marjorie A.H. Franklin, *KS A 1957*
1st woman initiated into Sigma Tau

### $25,000+
**Nagel Club**
Robert H. Nagel, P.E., *NY D 1939*
2nd Sec.-Treasurer of ΤΒΠ

### $10,000+
**Clarke Club**
Edith Clarke, WB #95
Inventor of graphic calculator

### $5,000+
**Evans Club**
Henry B. Evans, Ph.D., *PA A 1893*
1st president of Tau Beta Pi

### $2,500+
**Eaves Club**
Elsie Eaves, *CO B 1920*, WB #24
Influential civil engineer

### $1,000+
**Downing Club**
Lewis K. Downing, *MI G 1921*
1st Black HBCU engr. dean

### $500+
**Moore Club**
A.D. Moore, *PA G 1915*, ΤΒΠ president, Fellowship Program founder

### $250+
**Forman Club**
George W. Forman, *IL A 1941*
Led ΤΒΠ/Sigma Tau merger

**NOTES:**
**1.** Names preceded by SPEC denote gifts from non-members.
**2.** Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests.

Clarke Club
**Jim M. Tien, Ph.D.**
NY Γ '66
*"As Kahlil Gibran insightfully observed, 'You give but little when you give of your possessions.'"*

Eaves Club
**Teresa J. Hutton**
WI B '91
*"Because excellence and integrity in engineering deserves recognition."*

# Moore, Forman & Pre-Club Members Listed on website

Due to the number of alumni contributors, the Moore, Forman, and Pre-Club Members will be acknowledged on our website at: *www.tbp.org/?AGP*. All donations are essential to the continued success of the Association, but due to rising print costs of each issue, these donors will be listed with all of the other contributors in a protected PDF document. If you have questions or concerns, please contact *development@tbp.org*. Thank you for your understanding as we strive to produce an enjoyable and cost effective magazine for our readers.

## $1 MILLION+ Williams Club

**No alumni gifts for this quarter**

## $500,000+ Heikes Club

**No alumni gifts for this quarter**

## $250,000+ Harelson Club

**MI** E †Tillinger, Steven Jay '68
**TX** A Brill, Arno William '71

## $100,000+ Matthews Club

**NJ** A Forslund, Don Charles '60

## $50,000+ Franklin Club

**SPEC** Zeigler-Lyons, Nancy
**AZ** B Myers, Jerry Elwyn '70
**MS** A Sinclair, Bill Fredrick Hall '63

## $25,000+ Nagel Club

**CA** E Madni, Asad Mohamed '69
**MI** A Colbry, Dirk Joel '06
Colbry, Katy Luchini '99
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**TX** H Trich, John Albert '70

## $10,000+ Clarke Club

**SPEC** Anonymous
**CA** Λ Holl, Sue '76
**CT** B Hunziker, Bob Neal '83
**LA** E Champagne Jr., Pierre '76
**MI** Z Quaid, Rich C. '65
**NY** Γ Tien, Jim M. '66
**OK** A Morris, Jay Kevin '81
**SC** A Harman, Patrick '65
**TN** A Dodge, Frank T. '60
**TX** A Anonymous '63
Mickelson, Kent Burdell '77

## $5,000+ Evans Club

**CA** A Ikeda, Kenneth Akira '62
**CA** B Marshall III, J. Howard '57
**CA** Γ Kwok, Munson Arthur '62
**CA** Y Alexander, Joseph William '06
Alexander, Rachel Kristin '15
**FL** E Cowan Jr., David James '14
**MA** Z Cetti, Richard Phillip '70
**MI** Γ Sarns, Richard Norman '76
**MI** Z Cookman, Jordan Christopher '94
**MN** A Sandell Jr., Nils Richard '70
**MS** A Boozer, Drayton Daniel '66
**MO** B Gonzalez, Al '07
**NJ** B Boysen, Bob Lorenz '63
**NJ** Δ Yu, Jeff Chih-ping '89
**NY** Z Mendel, Jerry M. L. '59
**NY** Π Demmel, Hans George '83
**NY** T Olenik, Anthony Michael '08
**OH** A Ikeda, George Toshinori '54
**OH** N Struebel, Jonathan Paul '04
**PA** A Brunner, Thomas Morris '63
**PA** Δ Moore, John Howard '68
**SC** B Daley, Leslie N. '71
**TN** A Froula, Jim DeWayne '67
Jarratt, Jim Stroud '68
**TX** Γ Sandmann Jr., Charles W. '82
**TX** Δ Fowler, Joe Robert '68
**TX** E Bailey, Bob Richard '70
**VA** A Orphan, Victor John '62
**WV** B Ashman, Michael D. '84

## $2,500+ Eaves Club

**AZ** A Liu, Elson Yee-Hsin '02
**AZ** B Latta, David Raymond '89
Mingo, Doug M. '83
**AR** A Newtown Jr., Glenford Andrew '69
**CA** Δ Moretti Jr., Vincent Carlos '78
**CA** H Kruusmagi, Daniel Thomas '13
**CA** P Kraft, Lyle David '87
**CO** A Peters, Richard Duane '80
**CT** A Yamachika, Thomas '80
**DC** B Ratto, Christopher R. '07
**DC** Γ Keene, Warren Elmer '57
**FL** A Passman, Alan Joseph '06
**IL** A McGinnis, Gerald Edward '58
**KS** Γ Bucher, William Alexander '76
**MA** B Patterson, John Bryan '68
**MA** E Brunetto, Tom P. '74
La Lone, James Caryle '70
Moore, Timothy Eugene '71
**MI** A Chiti, James D. '71
McIntosh, Carl L. '70
**MI** Γ Stewart, Steve Russell '66
**MI** Δ Ponticello, John Charles '78
**MI** Θ Garrity, William Edwards '70
**MO** B Elliott, Joseph Oscar '71
**NE** A Steube, Milan Ray '74
**NV** A Lovekin, James Warren '80
**NJ** B Blasi, Michael G. '68
**NJ** Γ Mauermeyer, Henry A. '72
**NM** B Sullivan, Thomas Daniel '74
**NY** B Phillips, Glen E. '71
**NY** Γ Anonymous '52
**NY** Δ Jones, Paul Skeen '51
**NC** A De Haas, Cynthia '91
Maybee, Clare Lee '77
Phoenix, John Stuart '77
Vercaemert, Carol Starnes '76
**OH** A Ehlert, Donald Arthur '84
Hamilton, Joshua J. '09
**OH** Γ Wolff, Mark Frederick '88
**OH** Z Zelms, Charles Michael '73
**OH** H Sweeder, James '82
**OH** Λ Krueger, Karl Hermann '73
**OK** A West, Earl Ray '59

AUGUST 1 — OCTOBER 31, 2022

# Alumni Giving

Downing Club
**Alagappan Shanmugam**
NE Α '83
*"Supporting engineering education assists students going forward in tackling the most challenging problems."*

*Eaves Club continued*

**OR** Α Jones, Reilly '75
Milton, Stuart W. '84
**PA** Α Lasser, Howard Gilbert '50
**PA** Ε Ryan, Richard Edward '86
**PR** Α Hilerio Sanchez, Josuan '07
Merle-Ramirez, Luis F. '93
**RI** Α Healy, Henry Stephen '71
**SC** Β Husband, D. Mark '83
**TN** Α Choudhury, Ashok '83
Davis Jr., Fred Thomas '74
Hueser, David Lee '76
Sansom, William B. '64
**TN** Β Shackleford III, Jim Rufus '60
**TX** Α Herring, David M. '55
**TX** Β Berthold, Kristopher David '04
Darby, Mark Leslie '79
Glenn, Stephen W. '66
**TX** Δ Knowles, David Wayne '80
Simpson, Stancy Jean '79
**VA** Α Hardy Jr., Edward Ira '69
**VA** Β Creslein III, William Edward '52
**WI** Α Forkner, Stacey Lynn '96
Przedpelski, Zygmunt '53
**WI** Β Hutton, Teresa Jean '91

## $1,000+ Downing Club

**AL** Α Miller III, Edwin H. '84
Trapane, Karen Louise '82
Vollberg, Walter Karl '73
**AL** Β Bell III, Willis Vincent '78
**AL** Γ Hamilton, George Seaton '89
**CA** Δ Shields, Linda '84
**CA** Ε Axt, Bob Donald '66
**CA** Κ Humphreys, Evan '75
Treinen, Donald Joseph '83
**CA** Λ Sturgeon, Randy Randall '70
**CA** Ν Mayer, Robert James '85
Newberry, Conrad Floyde '57
**CA** Ξ Stewart, Diana Frieda '83
**CA** Ο Fiedler, James Michael '78
**CO** Β Gustafson, Molly Burkholder '85
**CO** Γ Ton, Scott Marshall '74
**CT** Β Pollack, Edward Eliot '70
Pollitt, Julie Anne '87
**DC** Β Gaffney, Joseph M. '83
**FL** Α Militello, Sam '61
**GA** Α Northington, Peyton Alexander '78
**IL** Α Schleicher, Kathy Louise '85
**IL** Β Hartwell, Robert Aaron '81
Johnson, J. Randall '63
Thomas Jr., Stanley Robert '72
**IL** Γ Quint, James Peter '66
Williams, Molly Wells '63
**IL** Δ Klasing, Wayne Gill '65
**IN** Α Forster, Allen Vaan '72
Lambert, Ralph Edward '68
Peak, Steve Charles '71
**IN** Γ Kukla, James Alfred '72
Murray, Francis O'Brien '68
O'Connor, Brian Thomas '72
**IN** Δ Ilten, Mark Owen '72
**IA** Α Haack, Leland Arthur '53
Henderson, Jim Allen '70
Kurr, Amy Catherine '18
**LA** Α Brack, Karen Guenther '84
**LA** Γ Randall, James Benjamin '79
**MD** Α Wiseman Jr., William Joseph '64
**MD** Β Brenner, David Joseph '60
Chase, Ronald John '71
Halvorsen, Fred H. '64
**MD** Γ Surina Jr., John Joseph '86
**MA** Α Bernacki, Stephen Edward '70
Griffith, Rebecca Anne '91
**MA** Β Slifka, Richard Barry '61
**MA** Ε Hayden, Thomas Lee '62
Johnson, David Norman '77
**MA** Θ Allen, Karen Leonard '89
**MI** Α Derby, Stephen George '69
**MI** Β Durfee, George Lee '51
Lindgren, Douglas LeRoy '69
Rom, David Bruce '56
Wilden, Helmuth '65
**MI** Γ Burkholder, Earl F. '73
Capelli, Ronald B. '73
Hammond, Donal Dwight '52
Pace Jr., George Donald '61
Pulley, Craig Martin '78
**MI** Δ Rossi, Nicholas Michael '63
**MI** Ε Whitehead, Tonya J. '17
**MI** Ζ Gillham, Gregory V. '83
Tarricone, Louis Guy '82
**MN** Α Carlson, Philip Jay '68
Lapakko, Kim Alan '76
Schwantz, Gary Lynn '73
**MS** Α Miller, Elton Ray '70
**MO** Α Lange, Stephen Joseph '85
Merz, Jeffrey B. '67
Miller, Raymond Bryant '53
**MO** Β Benson, William Alan '77
Unnerstall, James Anthony '56
**MO** Γ Dyson, Karen Anne '81
Dyson, Peter Bernard '80
**NE** Α Shanmugam, Alagappan '83
**NH** Β Cloyd, Joseph R. '02
**NJ** Α Waricka, Peter Thomas '71
**NJ** Δ Wolff, Richard John '72
**NM** Β Turner, Diane '78
**NY** Α Croll, John W. '12
**NY** Γ Levinson, Stanley H. '78
Walter, Robert Wayne '64
**NY** Δ Juister, Milton Henry '64
Van Arsdale, George Davis '62
**NY** Η Beron, Michael '71
Kern, Frank John '70
Schlein, Robert George '72
**NY** Θ Godlove, Katie Ann '02
Lester, John Welch '52
**NY** Ι Weinberg, Aaron '69
**NY** Κ Dennis, William John '74
Martens, Hinni Robert '57
**NY** Μ Hansen, Jean Griffith '77
**NY** Ν LaRosa, Anthony Phillip '77
Pardini, Thomas John '77
**NY** Ξ Mohan, Marguerite Anne '04
**NC** Α Davis, John Michael '73
Poindexter, Richard Clinton '64
**NC** Γ Hansen, Mikkel Anders '78
**ND** Α Engbrecht, James Richard '59
**OH** Α Oravec, Joan Marie '71
Smialek, Jim L. '68
**OH** Β Smelser, Ronald Eugene '71
**OH** Γ Powell, David Allen '71
**OH** Δ †Hild Jr., Wilbur Henry '64
**OH** Ε Egger, Robert Allen '85
**OH** Η Lantier, Ward John '63
Schneider, Greg Richard '80
Wolfe, Stephen A. '85
**OR** Α Stranahan, Chapman Arthur '65
**PA** Β Krolick, Ronald David '83
Zahora, Kenneth Richard '76
**PA** Δ Long, TC '95
**PA** Ε Hagadorn, Hubert William '59
Wetzel, Edward Donald '74
**PA** Θ Braun, James Francis '84
**RI** Α Biddle, Justin Miller '56
**SC** Α Drennan Jr., Robert Francis '70
**SC** Γ Julich, Thomas Frank '76
**SD** Β Johnson, Dean Hilbert '81
**TN** Α Cashion, Gregory Lee '79
Cook Jr., Joseph Campbell '65
Hickman, Charles Edward '57
Hitch, Benjamin Franklin '67
**TN** Β Hodges Jr., Willie Erwin '67
Pulley, Debra Domino '78
**TN** Γ Howey, James Edwin '68
**TX** Α Howerton, Lloyd Foster '51
Malins, Chester Joseph '76
**TX** Γ David, Anne Marie '87
**TX** Δ Johnson, Vance Clay '78
Newton, Philip Lynn '67
Perkins, Thomas Keeble '52
**TX** Η Godwin, Albert Eugene '84
Tepper, John C. '82
Williams, Larry Donal '80
Witt III, Arthur William '68
**TX** Θ Van Landingham, David J. '74
**UT** Α Lamph, Jane Ann Ann '80
Malmquist, David August '62
**UT** Β Hardy, Mark Douglas '84
**UT** Γ Cleave, Mary Louise '79
**VA** Α Conway Jr., George Franklyn '70
**VA** Β Snidow III, Lyle Christian '74
**VA** Γ Carlson, Diana Lu Weaver '91
**WA** Α Oiye, Martin Yasuyuki '76
Stiegler, Joe Edward '58
**WA** Β Groat, J. Everett '94

Downing Club
**Marguerite A. Mohan**
NY Ξ '04
*"Tau Beta Pi provides access to an ever expanding network of talented engineers."*

Downing Club
**Mark O. Ilten, Ph.D.**
IN Δ '72
*"The support ΤΒΠ is able to give our students is fantastic!"*

# Ensuring the successful future of Tau Beta Pi is a family affair!

## Meet Heritage Society Members Katy and Dirk Colbry

Katy Colbry, Ph.D., *MI A '99*, and Dirk Colbry, Ph.D., *MI A '06*, belong to a family that includes several members of ΤΒΠ. While both Katy and Dirk work at Michigan State University as the Assistant Dean for Engineering Graduate Student Services and Director of HPC Studies in Computational Mathematics, Science & Engineering Department, respectively, they are both long-time volunteers with the Association. Katy serves as the Director of Engineering Futures while Dirk is a MI Alpha Chapter Advisor and Engineering Futures Facilitator. Katy's parents became engaged to be married in MI Gamma's office, and we now have three Tau Bate brothers — Mark, Tim & Frank (all Luchinis).

*Katy and Dirk, along with their four children, live in Okemos, Michigan. Katy's mother is also pictured (middle).*

**THE HERITAGE SOCIETY** was created to recognize those who include Tau Beta Pi in their estate plans. Becoming a member can help the Association achieve its mission. For information, email Sherry Jennings-King at development@tbp.org or visit www.tbp.org/?Give

## Winter Brain Tickler Problems *Continued from page 25*

### COMPUTER BONUS:

Find the number of 10-digit integer ordered pairs (neither with leading zeros) such that the square of their sum is the 20-digit integer obtained from the concatenation of the two numbers, and provide the largest of the 20-digit concatenated integers.

—**Howard G. McIlvried,** *PA Γ '56*

Email your answers (plain text only) to any or all of the Winter Brain Ticklers to *BrainTicklers@tbp.org* or by postal mail to **Dylan Lane, Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697.** The method of solution is not necessary. The Computer Bonus is not graded. Where possible, exact answers are preferable to approximations. The cutoff date for entries to the Winter column is the appearance of the Spring *Bent* which typically arrives in late March (the digital distribution is several days earlier). We welcome any interesting problems that might be suitable for the column. Dylan will forward your entries to the judges who are **F.J. Tydeman,** *CA Δ '73;* **J.C. Rasbold,** *OH A '83;* **G.M. Gerken,** *CA H '11;* and the columnist for this issue,

— **J.R. Stribling,** *CA A '92*

# IN THE COLLEGES

Tau Bates having an impact at institutions of higher learning.

## Cynthia L. Barnhart Ph.D.

*Vermont Alpha '81*

Cynthia was named provost at MIT, where she is a longtime faculty member and past chancellor. She joined MIT's faculty in 1992, is a professor of engineering and professor of operations research at MIT Sloan School of Management. Cynthia has taught courses on large-scale optimization, airline operations research, and transportation operations, planning, and control.

## Juan C. Cendan M.D.

*Louisiana Beta '87*

Juan was appointed senior vice president for health affairs and dean of Florida International University's (FIU) College of Medicine. Joining FIU in 2021, he was vice-dean and executive associate dean for student affairs. He is a board-certified surgeon with a clinical focus on minimally invasive surgery and surgical disorders of the breast, with a BME from Tulane University.

## Lizette R. Chevalier Ph.D., P.E.

*Michigan Epsilon '88*

Lizette has been named dean at the University of New Orleans College of Engineering. She has 25+ years of experience as a faculty member, dept. chair, researcher, and administrator — most recently serving as associate provost for academic programs at Southern Illinois Univ. Her interdisciplinary research is focused on watershed science and environ. eng'g technology.

**SPOTLIGHT: ISE Professor Improving Ocean-Current Turbine Design—** At the University of Illinois at Urbana-Champaign (UIUC), **James T. Allison, Ph.D.,** *UT A '03,* is working with three research projects securing nearly $9.4 million in funding from the U.S. Dept. of Energy to help design new underwater turbines while also creating tools to assist other engineers. He is an associate professor of industrial & enterprise systems eng'g and director of the Engineering Systems Design Lab. Dr. Allison said "hydrokinetic turbines are at an earlier stage of development" and this research could have a big impact on the levelized cost of energy. A common theme across SHARKS projects is the design philosophy known as control co-design of which Dr. Allison is a pioneer.

**Clarkson Professor Receives TBP Faculty Award—** Presented by the New York Theta Chapter, the annual award recognizes a faculty member who has "embodied and instilled in students the ideals of integrity and excellence in engineering." **Pedro Fernández-Cabán, Ph.D.**, *PR A '12,* joined the Clarkson faculty in July 2019 as an assistant professor and recently joined FAMU-FSU as an assistant professor in the college of engineering. His research interests center on enhancing civil infrastructure performance under wind and other natural hazards. He was recently awarded a $200K NSF grant to continue research to explore new methods for mitigating wind damage on low-rise buildings.

## Mung Chiang Ph.D.

*California Gamma '00*

Mung was elected Purdue University president, beginning January 2023, where he's been the dean of engineering and executive vice president for Strategic Initiatives since 2017. He spent 2020 as scientific and technology advisor to the U.S. Secretary of State on a prestigious Intergovernmental Personnel Act appointment and has three Stanford engineering degrees.

## John G. Harris Ph.D.

*Massachusetts Beta '83*

John serves as dean, Florida Institute of Technology College of Engineering & Science in Melbourne. His new role began on July 1, 2022. Previously, he was on the faculty in the electrical and computer engineering department at the University of Florida for nearly 30 years and served as department chair there for the past 13 years. John has B.S. and M.S. degrees in EE from MIT.

## Caryn L. Heldt Ph.D.

*Michigan Beta '01*

Caryn was awarded the 2022 Faculty Distinguished Service Award at Michigan Technological University for "her efforts leading the COVID-19 testing lab on campus." She is professor and Endowed Chair of cellular and molecular bioengineering at Michigan Tech and also the director of Tech's Health Research Institute. She has B.S. and Ph.D. degrees in chemical engineering.

## Gül E. Kremer Ph.D.

*Iowa Alpha '92*

Gül has been named dean for the University of Dayton School of Engineering. She is a distinguished researcher, teacher, and university administrator. At Iowa State University, she served as a professor and senior director of presidential projects (office of the president). Her research accomplishments focus on applied decision sciences and operations research for design systems.

## H. Lee Martin Ph.D., P.E.

*Tennessee Alpha '78*

Lee was selected as the University of Tennessee's (UT) 2022 Nathan W. Dougherty Award winner. He is Professor Emeritus in the department of industrial and systems engineering at UT, where he created the Engineering Entrepreneurship Program. His ideas have led to several patents and public offerings. He has served as a chapter advisor and chapter president of the TN Alpha Chapter.

## Jayathi Y. Murthy Ph.D.

*California Epsilon '79*

Jayathi has been appointed president of Oregon State University. She has been serving as dean of the UCLA School of Engineering and Applied Science since 2016. Recognized as a national leader in higher education eng'g teaching, research and service, and advancing diversity, equity, and inclusion, she holds M.S. and Ph.D. degrees in mechanical eng'g.

**FACILITIES: New Facility Named for Engineer—** The Air Force Research Laboratory (AFRL) has hosted a ribbon-cutting ceremony for its newest wind tunnel facility and dedicated it to a beloved member of AFRL's Aerospace Systems Directorate. The Parker Subsonic Research Facility, or SuRF, is a low-speed wind tunnel used to evaluate prototype models including 3D-printed components. It is named in honor of **Gregory H. Parker, Ph.D.,** *MS A '88,* who passed away in 2019. Dr. Parker worked at AFRL as a senior aerospace engineer for 15 years, served active-duty Air Force for 20 years, and retired as a major. A colleague said that he "was instrumental in bringing this facility to life" and would have been delighted to see the facility advance science and technology.

**Rice University Working to Open New Engineering and Science Building—** With the support of an estate gift from Ralph S. O'Connor, the building is now under construction, will complete the Rice Univ. engineering quadrangle, and should open in summer of 2023. The 266,000-square-foot facility will have five floors of state-of-the-art laboratories, classrooms, and a makerspace. There will also be flexible offices with touchdown areas to support significant increases in faculty, post-docs, and graduate students. Named after its main benefactor, the Ralph S. O'Connor Building for Engineering and Science continues O'Connor's legacy of supporting Rice through professorships, student scholarships, and physical structures.

## Michelle D. Rambo-Roddenberry Ph.D., P.E.

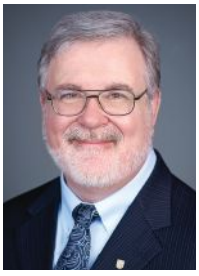
*Florida Eta '92*

Michelle was named the 2022 Engineer of the Year by the Florida Engineering Society. She is associate dean for academic and student affairs at Florida A&M University - Florida State University College of Engineering, where she's also a professor. Her research interests include bridge eng'g, emerging materials for bridges, and prestressed concrete.

## Richard J. Spontak Ph.D.

*Pennsylvania Beta '83*

Richard was named winner of the 2022 Roy W. Tess Award in coatings presented annually by the Division of Polymeric Materials: Science and Engineering in recognition of outstanding contributions to coatings science, engineering, and technology. He is a Distinguished Professor at North Carolina State University, Chief Advisor to the NC Alpha Chapter, and a 2021 ΤΒΠ Distinguished Alumnus.



## Andrea L. Welker Ph.D., P.E.

*Pennsylvania Zeta '91*

Andrea has been named dean of the school of engineering at the College of New Jersey. She has been working at Villanova University, where she began her faculty career in 1999, serves as associate dean for academic affairs for the college of engineering (COE), and co-founded the COE's Diversity, Equity, and Inclusion Committee. Two of her three civil eng'g degrees are from Drexel University.

# CHAPTER ETERNAL

Our fellow Tau Bates who are gone, but never forgotten.

CA I

California Iota '72

**Rodrigo T. Garcia, Ph.D., P.E.**

July 02, 2022

*Founded the Society for Hispanic Professional Engineers (SHPE) in 1974. He will be remembered as a visionary, leader, advocate, and engineer.*

The condensed style of these notices is made necessary by the Association's large membership and space limitations in *The Bent*. You may contact the Editor for additional facts (if available) concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Tau Bates, including full name and date of death. You may report the death of a member by sending an email to ***chapter.eternal@tbp.org.*** Members that were 100+ years when passing are identified with "***Cent.***"

## ALABAMA

**ALPHA** AL Α

Stephens, Merton Von, *'48*, June 17, 2006.

**BETA** AL Β

McInnis Jr., Albert *'43*, Sept. 23, 2022. ***Cent.***
Cowart, Eugene Guyland, *'48*, July 22, 2022.
Holtzclaw, Bynum Lee, *'50*, May 30, 2012.
Babcock, Roger Lee, *'57*, August 26, 2022.

**GAMMA** AL Γ

Breckenridge, Max C., *'83*, July 12, 2022.

## ARIZONA

**ALPHA** AZ Α

Hudson, Harold F., *'48*, December 30, 2002.
MacEvoy, Warren Douglas, *'49*, no details.
Perkins, Aladdin Norris, *'50*, March 27, 2010.
Shelley, Rulon Gene, *'58*, no details.

**BETA** AZ Β

Froyen, Leroy, *'68*, June 9, 2015.
Hislop, James Sewell, *'69*, Sept. 3, 2021.

## ARKANSAS

**ALPHA** AR Α

Couper, James Riley, *'49*, April 20, 2019.
Andrews, John Frank, *'51*, April 10, 2011.
Younkin, James Ray, *'52*, May 13, 2019.
Beeler, Theodore L., *'53*, Sept. 19, 2020.
Yates, Leo Carl, *'58*, April 1, 2018.
Brannan, Jimmy Irby, *'59*, January 18, 2014.
Chastain, J. Dee, *'59*, September 30, 2022.
Turpin, Jimmy Lee, *'59*, August 15, 2019.

## CALIFORNIA

**ALPHA** CA Α

Garretson, Bradley B., *'41*, April 8, 2004.
Humphreys, George B., *'51*, April 10, 2022.
Minner, Warren Andrew, *'51*, July 18, 2020.

**GAMMA** CA Γ

Krupp, Robert Fabin, *'38*, August 1, 1993.
Berger, Richard Steil, *'50*, October 11, 2017.
Kylberg, Richard L., *'56*, July 26, 2022.

**EPSILON** CA Ε

Hansen, Gerald James, *'57*, May 10, 2022.

**ZETA** CA Ζ

Power, John Desmond, *'48*, Nov. 17, 2018.

**ETA** CA Η

Blazin, Martin George, *'73*, Nov. 12, 1990.

**THETA** CA Θ

Ward, Michael Lynn, *'67*, July 28, 2022.

**IOTA** CA Ι

Garcia, Rodrigo T., *'72*, July 2, 2022.

**XI** CA Ξ

Wong, Frank, *'79*, January 1, 2022.

## COLORADO

**ALPHA** CO Α

Frederick, Wilbur Slater, *'56*, Feb. 26, 2021.
Waterman Jr., Robert H., *'58*, Jan. 2, 2022.

**BETA** CO Β

Steiert, Clarence J., *'49*, May 24, 2001.
Jarvis, Ronald Harden, *'58*, August 7, 2015.
Reinking Jr., Harvey W., *'58*, Sept. 26, 2021.
Goetz, Thomas Anton, *'64*, Dec. 4, 1998.

**DELTA** CO Δ

Saunders, Randall Scott, *'87*, April 13, 1999.

## CONNECTICUT

**ALPHA** CT Α

McDonald, James, *'37*, July 11, 2021. ***Cent.***
Kettering, William T., *'49*, Feb. 5, 2022
Vasey, Richard Carson, *'52*, March 15, 1999.
Shulman, Ronald Anthony, *'54*, Jan. 7, 2016.
Esserman Jr., Harry L., *'55*, August 18, 2022.

**BETA** CT Β

De Corso, Serafino Mario, *'48*, Jan. 23, 2017.
Sadowski, Walter Stanley, *'48*, Aug. 1, 2014.
Binks, Victor Joseph, *'56*, Dec. 10, 2021.

## DELAWARE

**ALPHA** DE Α

Podolsky, Leaman B., *'42*, Sept. 29, 2002.

## DISTRICT OF COLUMBIA

**GAMMA** DC Γ

Singpurwalla, Nozer D., *'64*, July 22, 2022.
Farinella, Frank Anthony, *'72*, Jan. 3, 2022.

## FLORIDA

**ALPHA** FL Α

Leavengood Sr., William H., *'47*, Jan. 6, 2017.
Nunnally, Stephens W., *'49*, March 31, 2022.
Gunson, William Edgar, *'50*, Sept. 15, 2021.
Hollifield Jr., Edwin J., *'53*, Oct. 1, 2004.
Bowles Jr., Carl Houston, *'54*, no details.
Cox, Roger Lawrence, *'55*, Sept. 30, 2021.
Lough Jr., Robert, *'61*, February 3, 2007.
Hadley, Kirby Lane, *'62*, July 24, 1988.
Knight, Bruce E., *'63*, no details.
Kuenzler, Howard Walter, *'64*, Sept. 18, 2022.
Caliendo, Joseph A., *'69*, August 15, 2019.

## GEORGIA

**ALPHA** GA Α

Shackelford, John Cooper, *'42*, Oct. 2, 2006.
Ogilvie, John Charles, *'48*, May 9, 2020.
Amis III, A.B., *'51*, November 19, 2018.
Barilovits Jr., Steve, *'51*, Sept. 13, 2014.
Henderson, Richard D., *'53*, Sept 20, 2022.
Prehoda, Frank Joseph, *'53*, March 4, 2022.
Little, Frank Cale, *'54*, May 14, 2018.
Bryant, David James, *'58*, July 10, 2020.
Pennington, Philip M., *'78*, June 21, 2022.

## IDAHO

**ALPHA** ID Α

Allen, Donald Guy, *'81*, no details.

## ILLINOIS

**ALPHA** IL Α

Christianson, Hilmar B., *'43*, July 23, 2009.
Schaeve, Donald Keith, *'48*, Jan. 22, 2010.
Wanderer, Donald W., *'49*, August 19, 2019.
Holonyak Jr., Nick, *'50*, September 18, 2022.
Rowland, Walter Francis, *'54*, Oct. 5, 2019.
Viskanta, Raymond, *'55*, December 27, 2021.
Burgess, Bruce Everett, *'56*, Oct. 23, 2020.
Kramer, Richard Gene, *'57*, Nov. 5, 2021.
Robinson, Ralph Ledic, *'57*, no details.

**BETA** IL Β

Martt, Ernest Cherington, *'45*, Nov. 6, 2006.
Norrlander, Roy Vernie, *'47*, Sept. 8, 2009.
Cox, Philip Keeton, *'48*, June 15, 2017.
Shub, Lionel, *'48*, December 18, 2008.
Jones, Harold Chester, *'49*, Sept. 18, 2021.
Wang, Tsih-Chang, *'49*, December 23, 2000.
Wassel, Eugene Stanley, *'51*, no details.
Chana, Howard E., *'53*, May 21, 2020.
Bobrowicz, Vincent Francis, *'54*, no details.
Novotny, Donald, *'56*, May 7, 2022.
Hogeboom, Neal Robert, *'60*, Jan. 4, 2007.

**GAMMA** IL Γ

Jefferson, Robert William, *'48*, no details.
Paik, Sungik Francis, *'58*, Dec. 18, 2021.

## INDIANA

**ALPHA** IN Α

Brophy, Donald Thomas, *'42*, Jan. 13, 2005.
McLaughlin, Howard Kay, *'45*, Aug. 8, 2000.
Tierney, John W., *'47*, August 25, 2020.
McCook, Thomas Joseph, *'49*, no details.
Stalk, George, *'49*, September 26, 2006.
Swihart, James Calvin, *'49*, June 27, 2017.
Blythe, James Edwin, *'50*, March 29, 2021.
McMahan, Wilbur Gene, *'50*, May 24, 2022.
Schneebeli, Robert E., *'51*, no details.
Stevens, Story Crandall, *'51*, no details.
Beaty, David Allison, *'52*, January 27, 2022.
Jicha, Albert John, *'52*, July 1, 2022.
Rust, Robert Allen, *'52*, April 10, 2017.
Bonneau, Art Marquis, *'53*, no details.
Osili, Ifeanyi, *'53*, February 29, 1996.
Bock, Robert Howard, *'54*, August 31, 2021.
Rodman, Ray Wilbur, *'55*, May 18, 2018.
Petersen, Richard H., *'56*, June 18, 2022.
Fries, Richard Edward, *'57*, Sept. 29, 2015.
Soedel, Werner, *'57*, June 22, 2022.
Kercher, David M., *'58*, June 26, 2022.
Tope, William Gene, *'58*, April 4, 2022.
Kotlarek, David Francis, *'81*, March 28, 1991.

**BETA** IN Β

Roesinger, Fred Richard, *'48*, no details.
Shimazu, Satoshi Don, *'49*, May 15, 2008.
Laxen, Gerald Cloud, *'50*, August 6, 2005.

**DELTA** IN Δ

Schueler, Stephanie M., *'85*, June 22, 2022.

## IOWA

**ALPHA** IA Α

Vail, Charles Edward, *'41*, August 3, 2019.
Clark Jr., Roy Alvin, *'46*, April 11, 2007.

Gotch, William Elmer, *'50*, October 14, 2019.
Manley Jr., Thomas L., *'53*, April 21, 2022.
Beal, Charles Edward, *'54*, Nov. 7, 2021.
DeVaul, Abram McLain, *'56*, Feb. 3, 2018.
Snowden, Danford Dale, *'58*, Dec. 31, 2006.
Gobel, Garreth Harold, *'64*, no details.

**BETA** IA B

Mohr, Ernest Edward, *'38*, Sept. 7, 2002.
Putman, Maurice W., *'43*, Dec. 11, 2011.
Brown, Irving, *'47*, March 21, 2005.
Moeller, Richard K., *'50*, October 20, 2005.

## KANSAS

**ALPHA** KS A

Woodman Jr., Clyde E., *'41*, Feb. 15, 2002.

**BETA** KS B

Merkel, Edwin William, *'62*, March 12, 2012.
Brane, Kevin Lee, *'78*, January 20, 2021.

## KENTUCKY

**ALPHA** KY A

Kozak, Eugene Dmytro, *'49*, Jan. 12, 2003.
Bennett, Henry Roberts, *'56*, July 8, 2022.
Troy, James E., *'68*, August 10, 2022.

## LOUISIANA

**ALPHA** LA A

Williams, Walter Charles, *'39*, Oct. 7, 1995.
Drees, Robert F., *'44*, October 10, 2021.
Pleimann, Larry Gene, *'56*, March 6, 2020.
Badon, Clyde Morrison, *'58*, Feb. 15, 2000.
Correa, Domingo Mateo, *'59*, August 9, 2022.
Redmond, Donald Charles, *'73*, Oct. 24, 2011.

**BETA** LA B

Peebles Jr., James H., *'46*, Jan. 21, 2021.

**GAMMA** LA Γ

Beedle, Warren Prescott, *'53*, May 19, 2020.
Horton, John Leroy, *'70*, February 7, 2017.
Farque, Gregory Lance, *'72*, May 20, 2012.

**DELTA** LA Δ

Heath, Weldon Francis, *'61*, no details.

## MAINE

**ALPHA** ME A

Korobkin, Leonard Richard, *'47*, July 2, 2014.
Geary, Arthur LaFond, *'49*, Nov. 17, 2005.
Harriman, Walter L., *'50*, Dec. 21, 2015.
Slade, Kenneth F., *'81*, August 19, 2022.

## MARYLAND

**ALPHA** MD A

Birx, Donald Lloyd, *'44*, August 25, 2021.
Farrier, John Marshall, *'44*, May 1, 2005.
Sechrist Jr., Chalmers F., *'52*, Oct. 29, 2020.
Mathis, James Oliver, *'75*, July 21, 2015.

**BETA** MD B

Shanklin Jr., Richard G., *'49*, Nov. 15, 2006.

## MASSACHUSETTS

**ALPHA** MA A

Baginski, Frank Charles, *'44*, July 3, 2019.
Ferson, Malcolm Earle, *'49*, Jan. 29, 2020.
Engman, George Emil, *'50*, January 1, 2018.
Dyer Jr., Raymond F., *'53*, April 26, 2022.
Gilbert, David Fanton, *'54*, August 20, 2022.
Gilbert, Richard Earle, *'54*, Nov. 29, 2014.
Dworkin, Larry, *'58,* February 26, 2022.

**BETA** MA B

Patterson, Roger W., *'44*, March 3, 1999.
Harp, Emile Francis, *'50*, February 21, 2000.
Johnston, Ralph C., *'50*, Nov. 26, 2021.
Carpenter, Jack William, *'51*, August 1, 2021.
Faller, Alan Judson, *'51*, March 12, 2022.
Fleck Jr., Philip Louis, *'52*, October 22, 2013.
Guppy Jr., John Warren, *'53*, July 19, 2022.
Maling Jr., George C., *'53*, June 9, 2022.
Poulos, Steve James, *'54*, October 6, 2016.
Zvara, John, *'54*, August 29, 2017.
Rossettos, John Nicholas, *'55*, Oct. 29, 2020.
Cowles, John Olmsted, *'56*, July 22, 2022.
Dorros, Irwin, *'56*, June 22, 2019.
Christian, John Thomas, *'57*, June 5, 2022.
Rook Jr., Charles Wesley, *'60*, Jan. 19, 2022.
Ketterer, Frederick David, *'63*, Aug. 2, 1998.
Vitt, Joseph Edward, *'64*, Nov. 22, 2000.

**DELTA** MA Δ

Milamed, Robert Louis, *'46*, January 9, 2016.
Green, Samuel Herman, *'51*, March 1, 2017.
Meade, David George, *'54*, October 1, 2018.
Terranova, Domenic S., *'55*, Sept. 20, 2022.
Cronin, John A., *'59*, January 27, 2022.
Kulpinski, Richard John, *'59*, Dec. 2, 2017.
Cantor, Stephen Robert, *'61*, May 6, 2002.

**EPSILON** MA E

Cail, Milton Leo, *'44*, July 28, 2021.
Field Jr., Charles H., *'52*, February 21, 2015.
Navarro, Robert Charles, *'55*, Oct. 26, 2021.
Guillette, Robert Alfred, *'58*, August 6, 2019.
Robbins II, Richard C., *'64*, January 20, 2016.
Fonseca, David Anthony, *'68*, May 26, 2022.

**ZETA** MA Z

Lawler, John Joseph, *'50*, no details.
Sethares, James Costas, *'59*, Feb. 29, 2020.
Zaidi, Azam M., *'85*, November 3, 2010.

## MICHIGAN

**ALPHA** MI A

Witte, Frederick Paul, *'50*, October 31, 2012.
Burke Sr., Thomas E., *'53*, March 15, 2004.
Stiling, Thomas Oliver, *'59*, April 12, 2022.

**BETA** MI B

Graves Jr., Stanley A., *'43*, Dec. 2, 2000.
Tartaron, Garland Joseph, *'53,* Oct. 22, 2021.
Kero, Donald L., *'58*, January 27, 2018.
Simonsen, Jens Ervin, *'59*, March 4, 2022.
Johnson, Sandy W., *'65*, Oct. 30, 2020.

**GAMMA** MI Γ

Rockwell, Dean Milton, *'43*, Nov. 29, 1998.
Geib, Arthur John, *'44*, November 1, 2021.
Forrestel, Richard E., *'45*, March 5, 2015.
Kaminski, Henry L., *'47*, March 30, 2016.
MacDermott, William Neil, *'49*, Dec. 5, 2020.
Peterson, Howard Carl, *'49*, Jan. 10, 2022.
Ross, Herbert Samuel, *'50*, April 15, 2022.
Smalter, Richard I., *'51*, March 2, 2022.
Bockemuehl, Robert R., *'52*, Jan. 30, 2017.
Bull, Joseph Saples, *'52*, April 20, 2022.
Swanson, Bruce Wayne, *'52*, June 13, 2022.
Haas, Eugene William, *'53*, October 1, 2015.
Finnegan, Patrick Marion, *'57*, July 12, 2021.
Kaufman, Merrill Lee, *'57*, August 8, 2022.
McDivitt, James Alton, *'59*, October 14, 2022.
Warner, John DeShon, *'62*, Sept. 8, 2021.
Willett III, George Howard, *'62*, July 13, 2022.
Bolas, Bruce James, *'63*, August 31, 2006.

**DELTA** MI Δ

Sommerfeld, Jude T., *'58*, April 15, 2022.
Thomas, Ronald W., *'60*, no details.
Schwing, Robert Louis, *'68*, August 17, 2022.
Flieger, James Kevin, *'74*, October 6, 2009.

**EPSILON** MI E

Paulson, James Marvin, *'47*, Jan. 4, 2021.
Cowell, Ronald James, *'62,* August 24, 2000.

**ZETA** MI Z

Cooney, Elaine M., *'84*, July 22, 2022.

**ETA** MI H

Eckel, James Bruce, *'79*, no details.

## MINNESOTA

**ALPHA** MN A

Biba, James Albert, *'46*, Sept. 20, 2017.
Harder, Richard Edward, *'53*, Aug. 25, 2021.
Roth Jr., Charles H., *'55*, August 24, 2022.

## MISSISSIPPI

**ALPHA** MS A

Shannon, Larry Sutton, *'57*, Sept. 9, 2001.
Sheely, William Baskerrill, *'60*, May 3, 1997.
Weller, Neal Ottway, *'60*, March 1, 1981.
Parker, Gregory Hershel, *'88*, May 27, 2019.

## MISSOURI

**ALPHA** MO A

Galpin, Jack Bruce, *'51*, August 18, 2013.
McDonald, Michael F., *'55*, Sept. 15, 2022.
Vetter, Louis Hugo, *'62*, September 4, 2022.
Rogers II, Dixon Carle, *'81*, April 13, 2010.

**BETA** MO B

Schowalter, Kenneth A., *'42*, Nov. 1, 1997
Chenoweth, Robert Dean, *'46*, Aug. 21, 2021.
Pierce, Ronald Ray, *'65*, April 5, 2021.
Bolin, Donald Henry, *'74*, October 3, 2022.

**GAMMA** MO Γ

Klein, Milton, *'44*, March 2, 2022.
Lich, Richard Louis, *'48*, October 8, 2015.
Rice, James Arthur, *'48*, August 12, 2016.
Miller, James Swift, *'55*, January 12, 2022.
Kubitza, Wilhelm Karl, *'63*, August 10, 2000.

## MONTANA

**ALPHA** MT A

White, Loren Ellwood, *'55*, March 12, 2005.
Erickson, Peter Benjamin, *'56*, July 3, 2022.
Scarrah, Warren Philip, *'57*, March 13, 2021.
Marcotte, Kenneth E., *'59*, March 30, 2001.

## NEBRASKA

**ALPHA** NE A

Peterson, Robert Ervin, *'54*, Feb. 12, 2015.
Foral, Ralph Francis, *'56*, March 20, 1989.

## NEW HAMPSHIRE

**ALPHA** NH A

Bonk, Joseph John, *'50*, December 1, 2017.
Knapp, Robert Eugene, *'57*, October 6, 2020.

## NEW JERSEY

**ALPHA** NJ A

Hill Jr., James Moore, *'44*, April 8, 2022.
Brenner, Kurt, *'50*, January 21, 2018.
Fusco, Benjamin Paul, *'50*, Sept. 24, 2011.

**BETA** NJ B

Sarraiocco, Peter M., *'49*, Nov. 10, 2015.

**GAMMA** NJ Γ

Pletzner, Charles Robert, *'47*, Jan. 8, 2017.
Stair, Russell G., *'47*, April 28, 2005.
Napoleon, James John, *'58*, no details.
Orlovsky, Harold, *'68*, January 12, 2000.

## NEW YORK

**ALPHA** NY A

Mertens, Lawrence E., *'51*, Dec. 16, 2017.

**BETA** NY B

Straub, Francis Joseph, *'50*, March 31, 2021.
Fishlock, Robert E., *'53*, February 23, 2016.
Leibson, Melvin Joseph, *'55*, Aug. 30, 2016.

**GAMMA** NY Γ

Savage, Robert Eugene, *'43*, March 29, 2022.
Lackey, Robert Samuel, *'46*, Feb. 14, 2017.
Mundhenk, Edward F., *'47*, March 18, 2019.
Stewart, Robert Samuel, *'47*, Aug. 24, 2012.
Otto, Carl W., *'48*, June 5, 2022. ***Cent.***
Bumstead, Richard, *'49*, June 28, 2017.
Bundschuh, John Joseph, *'49*, July 17, 2021.
Wilkinson, William Hadley, *'49*, Jan. 19, 2018.

# CHAPTER ETERNAL

Continued

IL A

Illinois Alpha '50
**Nick Holonyak Jr., Ph.D.**
September 18, 2022
*Developed the first practical visible-spectrum LED in 1962 while working at GE. He received the 1990 National Medal of Science and was a professor at the Univ. of Illinois .*

**GAMMA** NY Γ
Phares II, Elwood Willis, *'50*, July 19, 2022.
Sichel, Martin, *'50*, August 4, 2021.
Abernethy, Robert Bruce, *'52*, July 26, 2021.
De Groot III, Ward W., *'54*, March 8, 2022.
Donachie Jr., Matthew J., *'54*, Oct. 22, 2018.
Grinke, Walton James, *'57*, August 1, 2022.
Schiavoni, Dominic W., *'57*, Nov. 25, 2021.
Sutherland, William R., *'57*, Feb. 18, 2020.

**GAMMA** NY Γ
Denniston, Frank, *'61*, October 1, 2018.
Ferrante, Charles Joseph, *'66*, May 25, 1999.

**DELTA** NY Δ
Hogin, David Ralph, *'47*, May 25, 2012.
Kahle Jr., Loren Frederick, *'51*, July 8, 2022.
Itzkan, Irving, *'52*, June 30, 2022.
Gryson, Joseph Anthony, *'54*, Oct. 24, 2021.
Beachley, Norman Henry, *'56*, May 23, 2021.
Mollenauer, Linn F., *'59*, July 28, 2021.
Mintz, Max Luria, *'65*, April 18, 2022.

**EPSILON** NY E
Kieser, Frank Bernhart, *'41*, August 29, 1992.
Swanson Jr., Ernest S., *'49*, Sept. 3, 2010.
D'Agati, Ignazio Joseph, *'50*, June 25, 2021.
Greenfield, John Francis, *'50*, Nov. 15, 1998.
Waaland, Irving Theodore, *'53*, May 16, 2022.
Kuhn, Alfred, *'57*, July 9, 2021.
Camps-Campins, Francis, *'58*, Sept. 21, 2012.

**ZETA** NY Z
De Grande, Robert S., *'51*, February 17, 2009.
Kagan, Herman, *'51*, December 30, 2016.
Mohr, William Ludwig, *'56*, July 22, 2003.
Glomb, John D., *'59*, May 21, 2004.

**ETA** NY H
Reich, Ismar Meyer, *'45*, April 5, 2007.
Wechsler, Alan Lewis, *'48*, October 21, 1994.
Smith, Gerald Bee, *'50*, January 20, 2011.
Boyhan, Walter S., *'55*, November 21, 2021.
Lafrieda, James R., *'62*, July 27, 2022.
Wong, Chak Tung, *'75*, September 27, 1992.

**THETA** NY Θ
Fine, Morton S., *'37*, April 19, 2020. ***Cent.***
Bechamps, Eugene N., *'53*, July 5, 2019.
Dindo, Louis Aldo, *'54*, October 24, 2019.

**IOTA** NY I
White, Franklin Wayne, *'42*, October 9, 1999.
Aha, Eugene William, *'49*, Nov. 22, 2013.
Blake, Paul Joseph, *'54*, June 5, 2017.
De Giovanni, Felice Paul, *'67*, Nov. 6, 2021.

**KAPPA** NY K
Stroman, Robert M., *'45*, September 8, 2022.
Stocky, William Daniel, *'73*, August 4, 2001.

**LAMBDA** NY Λ
Schine, Lois, *'47*, July 7, 2022.

**NU** NY N
Giombini, Orlando Frank, *'50*, Feb. 8, 2015.
Haller, Sylvester Martin, *'51*, Oct. 23, 2003.
Fink, Francis Anthony, *'53*, February 1, 2021.
Shamp, Theodore Gary, *'59*, Dec. 19, 2008.

**XI** NY Ξ
McKenna, John Dennis, *'61*, June 14, 2022.

**OMICRON** NY O
Dhamecha, Nilesh R., *'02*, Sept. 5, 2013.

## NORTH CAROLINA

**ALPHA** NC A
Beard, Morris R., *'50*, October 26, 1994.
Haesloop, Richard, *'50*, August 23, 1960.
Gillesby, Fred Gearld, *'52*, July 10, 1959.
Fiedler, Maria Luise, *'72*, June 14, 2022.

**GAMMA** NC Γ
Murphy Jr., Alvin Rush, *'44*, April 13, 2022.
Block, Norman Gregory, *'54*, March 4, 2022.

## NORTH DAKOTA

**ALPHA** ND A
Fanslow, Glenn Ellsworth, *'53*, July 13, 2022.
Bauer, James Joseph, *'58*, June 10, 2018.

## OHIO

**ALPHA** OH A
Hosler, Peter, *'49*, June 22, 2022.
Gallaher, Lee Eastman, *'51*, Sept. 5, 2013.
Kasner, William Henry, *'51*, May 13, 2022.
Warnes, Don Eugene, *'51*, February 3, 2022.
Gepfert, Alan Harry, *'52*, January 18, 2022.
Olhoeft, Jack Emil, *'52*, September 7, 2019.
Patton, Richard Kellogg, *'52*, March 9, 2018.
Goodenow, Robert H., *'55*, August 22, 2005.

**BETA** OH B
Westfall, Richard E., *'60*, May 7, 2004.
Seifert, David Albert, *'63*, Sept. 26, 2022.
Foley, Malachy Jerome, *'68*, June 16, 2022.
Miller, James Angus, *'69*, October 3, 2021.

**GAMMA** OH Γ
Hatten, Bernard W., *'43*, Aug. 29, 2022. ***Cent.***
Craig, Dwight Richard, *'49*, July 19, 2019.
Schenk, Harold, *'51*, April 10, 2016.
Miller, Lyle Eugene, *'61*, September 22, 2014.

**DELTA** OH Δ
Nuscher, Eugene Hugh, *'53*, March 13, 2005.

**EPSILON** OH E
Reznik, Joseph Frank, *'50*, no details.
Konsevick, Walter Joseph, *'53*, Dec. 3, 2020.

**ETA** OH H
Breuer, Delmar Wallace, *'47*, Oct. 13, 2017.
Musson, Thomas Allen, *'65*, Nov. 4, 2020.
Vesely, Charles Joseph, *'69*, Dec. 30, 1998.
Hurst, Joseph Charles, *'74*, April 21, 2006.
Laposa, Joseph Emery, *'76*, Sept. 28, 2002.

**THETA** OH Θ
Boehman, Louis Ira, *'60*, April 3, 2004.

**IOTA** OH I
Tomkins, Robert G., *'61*, July 8, 2022.

## OKLAHOMA

**ALPHA** OK A
Ellis, Don Chauncey, *'56*, October 2, 2017.
Gabbert, Richard David, *'64*, Nov. 2, 1989.
Fielding, Robert Frank, *'66*, August 25, 1997.

## OREGON

**ALPHA** OR A
Gens, Ralph Samuel, *'49*, no details.
Matthews, Maurice M., *'49*, Aug. 21, 2018.
Merklin, Eldon Oren, *'52*, Dec. 19, 2018.
Johnson, Peter Edward, *'55*, June 11, 2020.
Gabrielsen, Bernard Lee, *'56*, Nov. 4, 2011.
Whittington, Edward J., *'59*, Jan. 29, 2002.
Kato, Howard T., *'62*, March 16, 2012.
Kameya, Andrew Momoru, *'66*, July 4, 2021.

## PENNSYLVANIA

**ALPHA** PA A
Sanderson, Clarence, *'42*, March 13, 2016.
Ellowitz, Howard Irwin, *'48*, May 23, 2021.
Smith Jr., Ethan Allen, *'48*, Feb. 18, 2021.
Gebhard Jr., John C., *'49*, Oct. 24, 2018.
Musser, Warren, *'49*, Nov. 25, 2019.
Pense, Alan W., *'57*, May 11, 2022.
Shumofsky, Allan Philip, *'64*, Oct. 17, 2022.

**BETA** PA B
Van Sickel, Edward L., *'51*, Feb. 24, 2021.

**GAMMA** PA Γ
Graham, James Barrie, *'40*, August 23, 2008.
Harwig, Stephen Holmes, *'42*, Jan. 13, 2013.
Au, Tung, *'43*, May 31, 2022.
Friedberg, Simeon Adlow, *'47*, Dec. 4, 2005.
Cutkosky, Richard Edwin, *'50*, no details.
Dague, Delmer C., *'50*, January 8, 1999.
Young, Hugh David, *'52*, August 20, 2013.
Agnew, Thomas Ira, *'55*, July 25, 2019.
Zdrojkowski, Ronald John, *'64*, June 7, 2022.

**DELTA** PA Δ
Korff, Marvin, *'50*, November 27, 2021.
Heiman, John Conrad, *'53*, Sept. 10, 2021.
Fruehan, Richard James, *'63*, July 3, 2022.
Haahs, Christopher Y., *'78*, May 1, 2014.

**EPSILON** PA E
Joung, Ki Sub, *'59*, February 5, 2020.

**ZETA** PA Z
Kolodner, Meyer, *'47*, April 25, 2020.
Thygeson Jr., John Robert, *'47*, Oct. 10, 2021.
Magasiny, Irving Pincus, *'48*, July 15, 2016.
Polaneczky, Aloysius J., *'48*, May 24, 2020.
Seligman, Joseph, *'48*, August 28, 2019.
Urkowitz, Harry, *'48*, June 8, 2018.
Lindinger, Joseph, *'49*, November 30, 2007.
Rosenthal, Frederick A., *'49*, Oct. 5, 2015.
McNamee, Bernard M., *'53*, July 3, 2022.
Morris, Richard Lee, *'70*, June 10, 2014.
Cohn, Ronald Paul, *'72*, September 17, 2022.
Rossi, Gary Edmund, *'79*, February 13, 2018.

**ETA** PA H
Hambleton, John Robert, *'49*, Nov. 6, 2019.
Mark, Seymour, *'50*, October 5, 2010.
Hendrixson II, William G., *'52*, Jan. 18, 2013.

**THETA** PA Θ
Dorsey, Joseph Charles, *'42*, Feb. 19, 2005.
Casey, Robert J., *'44*, October 11, 2017.
Plebani, Nicholas Robert, *'62*, Sept. 15, 2011.

**IOTA** PA I
Kaye, Ronald Edgar, *'49*, November 10, 2019.
Cox, Ronald Frank, *'69*, March 28, 2022.

**KAPPA** PA K
Brown, Robert Otis, *'49*, July 7, 2020.

**LAMBDA** PA Λ
Woo, Tse-Chien, *'46*, December 15, 2015.
Behare, William A., *'78*, Sept. 19, 2006.
Schwartz, Lawrence S., *'82*, May 14, 2001.

## RHODE ISLAND

**ALPHA** RI Α
Crimmin, Royce Bradford, *'48*, July 7, 2022.

**BETA** RI Β
Walch, Howard Charles, *'49*, Oct. 10, 2011.
Coman Jr., Stuart, *'60*, July 17, 2022.

## SOUTH CAROLINA

**ALPHA** SC Α
Evans, John Workman, *'48*, Sept. 18, 2022.
Lathrop, Jay Wallace, *'48*, October 9, 2022.
Fain, Charles Clifford, *'54*, Nov. 29, 2020.
McCoy Jr., Hugh Eugene, *'54*, Feb. 5, 2021.
Sams III, James H., *'54*, March 17, 2013.

**BETA** SC Β
MacFie, Thomas E., *'50*, January 10, 2021.
Brunk Jr., Earl Franklin, *'61*, April 19, 2022.

## SOUTH DAKOTA

**ALPHA** SD Α
Schafer, Richard L., *'51*, July 21, 2021.

**BETA** SD Β
Engle, William Ray, *'73*, October 10, 1988.

## TENNESSEE

**ALPHA** TN Α
Krieger, Arnold David, *'48*, Sept. 10, 2022.
Richardson, Hugh Hill, *'50*, October 29, 2020.
Babb, Wesley Dean, *'81*, Sept. 15, 2022.
Day, William Michael, *'82*, no details.

**GAMMA** TN Γ
Duke, Albert Link, *'48*, March 13, 2006.

**DELTA** TN Δ
Woodrum, Gary Lee, *'85*, April 13, 2022.

**EPSILON** TN Ε
Jarrell, Kenneth Wayne, *'87*, Jan. 10, 2012.

## TEXAS

**ALPHA** TX Α
Belknap Jr., Ralph A., *'44*, August 8, 2022.
Carlile Jr., Hollis Buel, *'49*, October 14, 2016.
Machemehl Jr., Charles A., *'57*, Jan. 9, 2022.
Colunga, Daniel, *'66*, September 1, 2022.

**BETA** TX Β
MacKenzie, Horace Jurs, *'48*, no details.

**GAMMA** TX Γ
Boggs Jr., Marion A., *'46*, Dec. 22, 2021.

**DELTA** TX Δ
Barclay Jr., George W., *'51*, August 31, 2022.
Finch, Homer Joe, *'51*, April 5, 2016.
Fockelmann, William F., *'51*, Oct. 14, 2015.
Broesche, Joseph Gerald, *'56*, Nov. 27, 2011.
Fly, Melton LaRue, *'56*, August 25, 2020.
Isiminger, David Marion, *'56*, May 14, 2017.
Bryan, William W., *'58*, September 16, 2022.
McMullan, Charles Dewey, *'58*, May 18, 2012.
Phillips, Bobby Wayne, *'59*, August 8, 2022.
Sovinski, John Robert, *'70*, July 14, 2005.

## UTAH

**ALPHA** UT Α
Hills, Frank Bagbey, *'52*, August 11, 2017.
Busenbark, Blaine T., *'54*, July 12, 2022.
Call, Quinn Richard, *'57*, August 22, 2019.
Shurtleff, Gerald R., *'60*, Aug. 19, 2007.
Johnson, Terry Gordon, *'61*, July 24, 2010.
Russell, Christopher P., *'70*, no details.

**BETA** UT Β
Bills, Delbert Ray, *'62*, August 10, 2022.

## VERMONT

**ALPHA** VT Α
Riley, Frank Robert, *'65*, October 1, 2006.

## VIRGINIA

**ALPHA** VA Α
Kjellstron, Nils David, *'41*, August 26, 2005.

**BETA** VA Β
Gary, James Hubert, *'42*, June 8, 2015.
Fondrk, Victor Vincent, *'45*, August 26, 2007.
Fairey, John Paul, *'51*, January 25, 2017.
Hawke Jr., Nathaniel J., *'51*, Sept. 2, 1993.
Baker, William Hubert, *'57*, June 13, 2022.
Gross Jr., Vernon Carl, *'63*, May 22, 2022.
Shea, Tracey Eileen, *'91*, May 22, 1997.

## WASHINGTON

**ALPHA** WA Α
Brown, Floyd Quentin, *'45*, August 30, 1992.
Montan, Donald Noel, *'52*, March 3, 2003.
Lawlor, Francis Joseph, *'61*, Nov. 4, 2010.
Ruhl, Orla Victor, *'61*, October 6, 2007.

**BETA** WA Β
Greiner, Richard Carl, *'43*, August 31, 2009.
Vea, Lester E., *'50*, no details.
Stitzel, Thomas Edward, *'57*, Sept. 9, 2021.
Kinney, Robert L., *'66*, no details.

## WEST VIRGINIA

**ALPHA** WV Α
Caruso, Philip Alfred, *'50*, October 8, 2017.
Clevenger, James P., *'60*, April 30, 2022.

**BETA** WV Β
Blosser Jr., Robert Lee, *'91*, Dec. 23, 2017.

## WISCONSIN

**ALPHA** WI Α
Myers, Phillip Samuel, *'42*, October 18, 2006.
Spink, Paul George, *'49*, April 8, 2017.
Barth, Donald O., *'50*, January 8, 2018.
Bolender, John William, *'51*, Sept. 25, 2022.
Edwards, James Eugene, *'52*, Oct. 19, 2022.
Finner, Marshall Frederick, *'53*, July 5, 2022.
Gritzmacher, Donald E., *'53*, Jan. 1, 2015.
Hagen, David Lawrence, *'55*, Dec. 11, 2017.

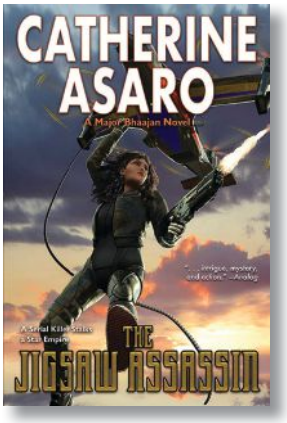
**BETA** WI Β
Weyrough, Joseph T., *'41*, March 18, 2016.
Lindsay, Robert Herbert, *'49*, July 17, 2018.
Leigh, Paul Gordon, *'51*, January 25, 2022.

## WOMEN'S BADGE

Carney, Sue H., September 8, 2006.
Dipalo, Helen K., July 10, 2009.
Holmes, Hallie B., April 10, 2010.
Mclean, Elizabeth J., September 18, 2003.
Steward, Marion L., no details.
Williams, Elwin Louise, August 9, 2012.

# Authors

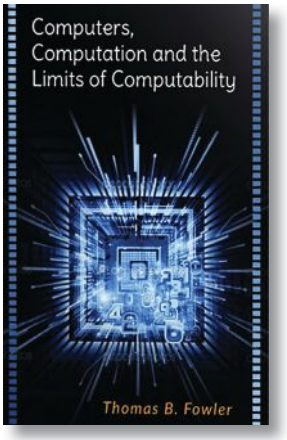
*Recently published a book? If so, we would like to recognize you! Send details and a cover image to dylan@tbp.org.*
*Note: This section has become extremely popular and submissions are first come, first served, as room allows. Thanks!*




**Catherine A. Asaro, Ph.D.**
*California Epsilon '78*

**The Jigsaw Assassin**

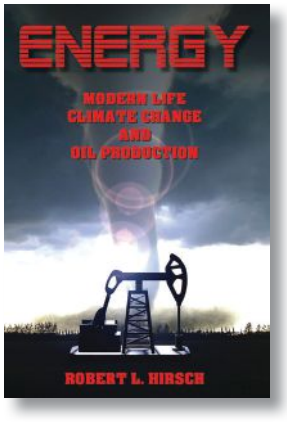
Catherine's 32nd novel is a stand-alone installment in the Major Bhaajan series of science fiction mysteries. A two-time winner of the Nebula Award, she has received multiple Hugo nominations for her works. She earned a Ph.D. in chemical physics from Harvard and a B.S. in chemistry from UCLA.




**Thomas B. Fowler, Sc.D.**
*Maryland Beta '72*

**Computers, Computation, and the Limits of Computability**

Thomas' book seeks to give the reader a bird's eye view of the entire computing landscape, and is directed to those who want a broad perspective on computers/computing and are not clear about types of computers and the tasks each type can best perform. He's an ECE adjunct professor at George Mason University and telecommunications consultant.




**Robert L. Hirsch, Ph.D.**
*Illinois Alpha '58*

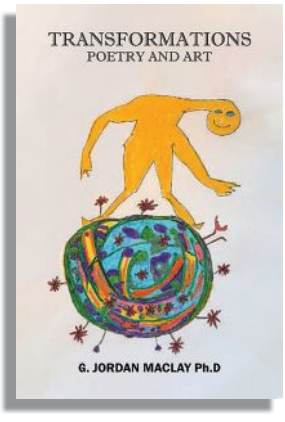
**Energy: Modern Life, Climate Change, and Oil Production**

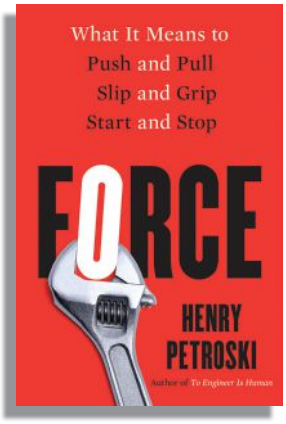
In his second book, Dr. Hirsch defines and clarifies the biggest upcoming issues related to climate change and a world oil shortage, so readers have the opportunity for informed action. Robert is a physicist involved in energy issues since the 1960s, directed the U.S. fusion energy program in a variety of government positions, and is a senior energy advisor at MISI and energy consultant.

**G. Jordan Maclay, Ph.D.**
*Illinois Zeta '65*

**Transformations: Poetry and Art**

An EECS Emeritus Professor at the Univ. of Illinois at Chicago, Jordan would write poems and draw pictures in his research notebooks. After retirement, he decided to make them into a book exploring, with humor and compassion, the transformations experienced moving beyond the challenges of life into the freedom of self-expression. He has a Ph.D. from Yale University.

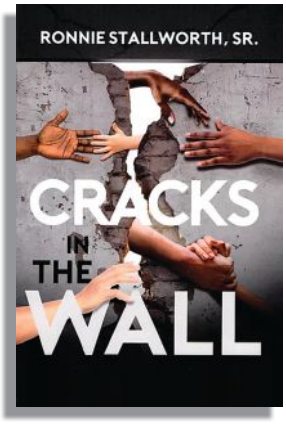



**Henry Petroski, Ph.D., P.E.**
*New York Xi '63*

**Force: What it Means to Push and Pull, Slip and Grip, Start and Stop**

Published in September, Henry's book explores the amazing forces at play as humans interact with the world every day. A Distinguished Professor Emeritus at Duke Univ., he's renowned for conveying the wonder of physics and engineering to readers from all walks of life and revealing the forces that underlie our experiences.




**Ronnie L. Stallworth Sr.**
*Alabama Epsilon '03*

**Cracks in the Wall**

This is an uplifting and inspirational book written by a 'Hidden Gem' raised by an elderly father during the 1960s. Ronnie overcame extreme poverty, homelessness, and illiteracy, and achieved success as an engineer, VP of a *Fortune 100* company, and philanthropist. The lessons in this book are cross-generational with the simple message: ***reach through the cracks in the walls that divide us.***

**BRIDGET A. MOORMAN, BSME, MSBME, CCE, COL, USAF (Ret.)** has 30+ years' experience in the clinical engineering/digital health field working and consulting for large healthcare organizations as well as serving as chair of the board of examiners for certification in clinical engineering (2011-13). She has worked in bio-mechanical research, power-line relay design and space system launch, and telecommunications. As an Air Force reservist, Bridget served as IMA to the MILSATCOM Directorate. Her B.S. from Arizona State University (ASU) is in ME; M.S. in BME from Rensselaer Hartford Graduate Center; and MAS in healthcare informatics ASU College of Health. Her professional awards include the 2019 ACCE/HIMSS Excellence in Clinical Engineering and Information Technology Synergies Award. She is an Instrument Private Pilot, Single Engine Land.

## Works Cited

1. Shigley, J. and Mitchell, L., 1983. Mechanical Engineering Design. New York: McGraw-Hill, 4-5.
2. Ibid, pp 6-8.
3. Norman, D. (2013). The design of everyday things: Revised and expanded edition. New York; London: Basic Books; MIT Press (British Isles only), 217.
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9. Selinger, C. (2004). The creative engineer: what can you do to spark new ideas? IEEE Spectrum, 41(8), 47–49. https://doi.org/10.1109/mspec.2004.1318183
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13. Ibid, 216.
14. Norman, D. (2022, June 1).
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18. Moorman, B. (2018, March 8). It's all about the Data II – A Virtual Medical Device-AMP3D. Bridget Moorman. Retrieved July 28, 2022, from https://www.linkedin.com/pulse/its-all-data-ii-virtual-medical-device-amp3d-bridget-moorman/
19. Ibid
20. Chi, C. (2022, September 28)

# PRESIDENT'S REPORT

CONTINUED FROM PAGE 12

## FINANCES

The Trust Advisory Committee (TAC) is responsible for the financial portfolio of the organization. The TAC grew at the end of 2020 to increase the number of members from three to five. The EC transitioned the trustee of the funds from PNC Bank to Vanguard. By request of the TAC and trustee, the Convention Chapter and Association Financial Affairs Committee will review a recommendation to allow the Association to invest in private equity.

The EC undertook a thorough review of the current restricted and unrestricted funds. Approximately five million dollars of net assets that were considered donor restricted appear to be donor unrestricted. We will continue to work with our auditors and update the Association accordingly.

The Tau Beta Pi Trust was valued at $25.93 million in 2020, $41.6 million in 2021, and $35.7 million in 2022.

As of July 2021, our unrestricted alumni giving was $1.13 million from 10,073 donations. This July 2022 saw the largest giving in our Association's history with $1.274 million from 9,332 donations. The generosity of our donors allows us to continue our programs.

## SCHOLARSHIPS & FELLOWSHIPS

Tau Beta Pi awarded 261 Scholarships and 28 Fellowships in 2021 and 254 Scholarships and 31 Fellowships in 2022. Recipients will use these funds to continue their education. We encourage our students to apply for Fellowships and Scholarships.

The use of Student Assistance Program (SAP) Fund was leveraged in 2020. Although not technically within the scope of the report, it deserves a second acknowledgement by the Association.

The SAP Fund was created based on the interest and generosity of **C.C. Young,** *IL Alpha 1924*. It was established in 1992 to provide funds to student members of Illinois Alpha and other ΤΒΠ chapters who would otherwise be without financial resources to remain in college. Repayment is not required and interest is not charged.

One of the few principles of the SAP is that "students are asked to help others in need when and if they become financially secure."

The decision was made in spring of 2020, at the height of the global pandemic and with many students struggling to find summer work or internships, to spend a large portion of the Student Assistance Program Fund.

In September 2020, ΤΒΠ distributed $112,500 in grants to 45 student members in amounts of $2,500 each. The primary goal was to relieve student tuition debt and alleviate other financial burdens.

## ORGANIZATIONAL ADDITIONS

Four new committees were chartered this year: **Diversity, Equity, and Inclusion** (DEI), **Chapter Development**, **Membership**, and **Advisors**. The Chapter Development Committee works to support the chapters throughout the year. The Advisors and Membership Committees are working to improve the core of advisors and enhance membership activities. The DEI Committee is exploring the leadership role Tau Beta Pi can play in those efforts.

New Engineering Solutions for Tomorrow, or **NEST**, is the newest program proposal submitted to the EC. The program seeks student submissions of solutions to general topics chosen by the Convention body. Its mantra is to "engage engineers to create awareness to solve societal challenges of today."

## ELECTIONS

A Ratification Ballot was sent to every chapter with a proposal to change the current EC election process. Because a sufficient number of chapters did not submit a ballot, the EC voted in April 2022 on behalf of the missing chapters to ratify the change. An addendum to the C&B was given to each delegate that reflects the change. The new process uses an instant runoff ranked choice voting method.

Four members are seeking a three-year term on the EC. Three will be elected using the instant runoff ranked choice voting.

## NEW NORMAL

We are currently navigating a new normal mode of operation. This year's Convention will cover two years of business, which for some committees is a heavy lift. The EC appreciates the time taken by our members to attend Convention and conduct the business of the Association.

We invite attendees to come meet and discuss Tau Beta Pi with any member of the Executive Council. We are available and at your disposal.

**MENNA YOUSSEF** works as a supervisory patent examiner for the USPTO. She was first elected to the ΤΒΠ Executive Council in 2016, was re-elected in 2019, and served as president in 2022. Her B.S. and M.S. degrees in electrical engineering were earned at Old Dominion University and her Ph.D. is from the University of Dayton.

# COUNCIL'S CORNER

continued from page 2

Once the motion is open for debate, delegates will queue at microphones distributed in key positions and will be recognized by the Convention Chair to state their name and chapter with comments either for or against a motion. The Convention Chair and Parliamentarian are encouraging and helpful to delegates to put together motions such as an amendment or to ask questions. Throughout the audience, many alumni also provide guidance on how to make amendments or ask questions and direct delegates to appropriate Constitution sections or background materials. District 16 Director Neal Bussett coached me to make a comment at my first Convention. His encouragement gave me the confidence to contribute to the discussion. That experience is why I recommend voting and non-voting delegates sit together at the business meetings to help one another.

There is more to Convention than the business meetings and committees. Professional Development Sessions are presented by TBΠ alumni covering topics ranging from personal finance, graduate school, career paths, networking, career soft skills, and panel discussions. TBΠ hosts an in-person Career Fair with recruiters from graduate schools and companies. At the 2022 Convention, we had both a virtual and in-person Career Fair.

We also present national awards recognizing advisors, mentors, laureates, and alumni. The Awards Committee selects the R.C. Matthews Outstanding Chapter, the R.H. Nagel Most Improved Chapter, and the J.D. Froula Most Improved Membership Chapter. Additionally, collegiate chapters receive Chapter Project Awards for outstanding performance and Chapter Excellence Awards for meeting required reports and performance in 41 criteria areas. We also recognize the contributions and dedication of our advisors and volunteers by length of service. The hosting chapter typically provides an opportunity to tour their campus and learn about their history. This year, we toured TBΠ's Headquarters, signed the guest book, heard a brief presentation by Executive Director Curt Gomulinski, and saw historical Association memorabilia.

One of my favorite parts of Convention is the Model Initiation which demonstrates how to perform the initiation ceremony, the setup, and some common difficult parts with tips from our Director of Rituals.

This year, four chapters were approved to join the Association, so the Model Initiation Ceremony included members from our host chapter at the University of Tennessee and delegates from the new chapters at Lipscomb University, Merrimack College, the University of Georgia, and Western Carolina University. The Model Initiation is attended by all the initiated members at Convention. Each time I attend an initiation ceremony, it reminds me of my own and gives me a stronger, deeper connection to the Association. It always reminds me that I am a small part of something bigger than myself and fills me with a renewed sense of purpose. Please join me in congratulating and welcoming these new chapters and this semester's newly initiated members.

The most important part of Convention is the people. The HQ staff, volunteers, hosting chapter(s), delegates, advisors, district directors, program directors, EF Facilitators, speakers, Student Advisory Board, Trust Advisory Committee, and committee advisors are needed to make Convention a success. I thank all of you for the time, dedication, and hard work. The outpouring of social media posts from the delegates was amazing to see after not having an in-person Convention since 2019.

What makes Tau Beta Pi so special is our members and what the Association does for them. The years that I've been involved as a volunteer have been so rewarding to me both personally and professionally. I've developed friendships, leadership skills, received career advice, helped students put together their resumes and prepare for interviews, and write for *The Bent* magazine. Each time I volunteered, I found the experience improved me as an engineer and project manager.

I strongly encourage everyone to network with our members, share your ideas and passions, mentor one another, and to always provide the same experience to those who follow us. If you haven't already, connect with TBΠ on LinkedIn and our social media channels. We would love to hear your stories about your experience with the Association and Conventions past. There are many opportunities for volunteering that have different levels of commitment and time involvement.

**You** are what makes Tau Beta Pi special. You are passionate, dedicated engineers who are engaged in your associates, organizations, industries, and communities.

**RACHEL ALEXANDER** works as a civil engineer for the Sacramento County Department of Airports. She was first elected to the TBΠ Executive Council in 2019, was re-elected in 2022, and will serve as president in 2023. Her B.S. degree is in civil engineering from California State University, Sacramento, and she is a registered professional engineer in California.

# Chapter Awards

MI Gamma Chapter president Zachary Goldston (left) and Awards Committee vice chair Jared Welch, *NY B '23*.

**OUTSTANDING CHAPTER AWARD:**

## Michigan Gamma

The Michigan Gamma Chapter at the University of Michigan received the 2020-21 R.C. Matthews Outstanding Chapter Award. *Established in 1956, this award encourages and recognizes high-grade work by chapters in both routine and special affairs. It is based on how well the chapter service projects fulfill the objectives of TBP and quality and promptness of reports*. Here's what the Awards Committee had to say about the 2020-21 winning chapter:

"MI Gamma's outstanding resilience in the face of adversity and strong commitment to community service has astonished and inspired this year's Awards Committee. We all agreed that the continued service to your members was resounding. Amidst the COVID-19 crisis when your university was online, the constant stream of high quality virtual social events kept the membership engaged and excited about Tau Beta Pi while most of us wanted to disconnect. Additionally, your community outreach knew no bounds and you were able to have a tangible impact on Cub Scouts and elementary school and middle school groups through STEM centered volunteering events." Congratulations on a job well done!

MICHIGAN GAMMA CHAPTER LEADERS (2020-21):

President – **Ranadeep Mitra, *MI G '22***

Vice President – **Erik M. Radakovich, *MI G '23***

Treasurer – **Richard H. Wang, *MI G '23***

Recording Secretary – **Zachary W. Goldston, *MI G '23***

MICHIGAN GAMMA CHAPTER CHIEF ADVISOR (2020-21):

**Kyle A. Lady, Ph.D., *MI G '10***

**HONORABLE MENTION** — Outstanding Chapter Award
**California Psi** (University of California, San Diego)

★ ★ ★ ★ ★

## Chapter Awards 2020-21

**Due to the cancellation of the 2021 Convention, the 2020-21 R.C. Matthews, R.H. Nagel, and J.D. Froula awards were *not* selected.**

**At this year's Convention, these chapter awards were selected and announced by the Awards Committee. Congratulations to these outstanding ΤΒΠ chapters as we recognize their successes during the pandemic.**

**The Chapter Excellence Awards and Project Awards for 2020-21 were published in the Winter 2022 issue on pages 14-15.**

★ ★ ★ ★ ★

Tau Beta Pi
The Engineering Honor Society

# 2020-21 Awards

CA Alpha Beta Chapter Advisor Kimberly Bennett with Awards Committee Chair Owen Convery, *CA S '23*.

DE Alpha Chapter attendee Georgia Angeletakis with Executive Director Emeritus J.D. Froula.

**MOST IMPROVED CHAPTER AWARD:**

## Cal Alpha Beta

The California Alpha Beta Chapter at the University of California, Riverside was selected as recipient of the 2020-21 R.H. Nagel Most Improved Chapter Award.

CA Alpha Beta was selected to receive this prestigious award for "an increase in the quality and quantity of chapter projects, including increasing social media presence, collaborating with Engineering Futures, handing out multiple newsletters during the year, and collaborating with other organizations on campus such as BMES and RoseHack, the women-centric hackathon. In addition, the quality and promptness of chapter reports has increased with over 30 documented successful events. Finally, the overall participation and membership of the chapter has improved significantly." The Awards Committee commends you for your continued progress.

CALIFORNIA ALPHA BETA CHAPTER LEADERS (2020-21):

President – **Pallavi Sripathi, *CA AB '22***

Vice President – **Nicolas D. Andrade, *CA AB '21***

Treasurer – **Joshua V. Go, *CA AB '22***

Recording Secretary – **Beatriz Velazquez Benitez, *CA AB '22***

CALIFORNIA ALPHA BETA CHAPTER CHIEF ADVISOR (2020-21):

**Daniel Wong, Ph.D., *CA D '09***

**HONORABLE MENTION** — Most Improved Chapter Award **California Eta** (San Jose State University)

**MOST IMPROVED MEMBERSHIP AWARD:**

## Delaware Alpha

The Delaware Alpha Chapter at the University of Delaware is recipient of the 2020-21 J.D. Froula Most Improved Membership Award.

Established by the Executive Council in 2011 and named in honor of Executive Director Emeritus **Jim Froula, P.E. (ret)**, *TN A '67*, this award is granted based on significant improvements in chapter membership performance embodying the campaign to "Initiate One More," a challenge for chapters to improve membership metrics each year.

The DE Alpha Chapter, located in Newark, Delaware, was founded on November 25, 1933, and has inducted 2,679 Tau Bates. Currently, the chapter is focused on developing a mentor program for underclassmen and supporting local philanthropic organizations.

DELAWARE ALPHA CHAPTER LEADERS (2020-21):

President – **Abdul Abdul Kadir, *DE A '22***

Vice President – **Rainer J. Hlibok, *DE A '21***

Treasurer – **Nafisa Maryam, *DE A '23***

Recording Secretary – **Kathryn S. Strand, *DE A '23***

Corresponding Secretary – **Jacob D. Hewes, *DE A '23***

DELAWARE ALPHA CHAPTER CHIEF ADVISOR (2020-21):

**Abraham M. Lenhoff, Ph.D., *DE A '76***

**HONORABLE MENTIONS** — Most Improved Membership Award: **Missouri Beta** (Missouri Univ. of Science & Tech) **Texas Gamma** (Rice University)

Letters continued from page 3.

## Fusion Ready for Prime Time

The article on fusion provided a balanced presentation of the state of fusion development comprising both major milestones achieved and challenges remaining. The "$5 billion injected into 33 fusion startups over the past two years" represents a stark contrast with the commercialization of fission reactors in the 1950s and 60s. In the 50s and 60s, fission reactors were developed and commercialized by the military, the Atomic Energy Commission, and large corporations e.g. Westinghouse and General Electric. Decisions regarding what type of fission reactor design to adopt for civilian power plants were inextricably intertwined with decisions regarding naval propulsion reactor design. The design of America's first commercial scale nuclear power plant was based on the design of an aircraft carrier pressurized water reactor (PWR) (Shippingport Atomic Power Station: Five Fast Facts — ANS/Nuclear Newswire). The PWR is the dominant reactor employed in today's fleet of domestic commercial nuclear power plants.

Today, engineers contemplating fusion as an area of graduate study or employment are not exclusively dependent upon federal funding. Moreover, fusion reactor design choices are not the exclusive domain of any government or international consortium. Several of the technical approaches to fusion being pursued by venture-funded startups, as described in the article, appeared to be more promising than the $25 billion ITER project under construction in France. As explained in the article's interview of Dr. Jassby, ITER's "net energy balance will be zero." A power plant with a zero net energy balance is a far cry from commercial viability. The increased involvement of nimble, private sector capital in the development of fusion will greatly benefit the public and those engineers and scientists participating in bringing this technology to fruition.

***Richard T. Redano,*** *NC A '78*

## Fusion Ready for Prime Time

I had been waiting for an article like yours covering the state of the art in fusion power. About 35 years ago, I would drive past the Princeton fusion project every day to and from work. The prospect then was 25 years till breakeven and commercial power generation only a decade or two after that. Even 20 years later, it was still 25 years in the future. From your article, a Q substantially above 1 is still decades in the future. The news that was most interesting was a startup able to raise a billion dollars and dozens of other startups collectively raising billions more. The variety of technologies and alternate designs you describe seems to recognize that incremental improvements won't get us to the goal. I guess that is why venture capital is pouring into these novel alternatives.

All in all, very nice coverage of the core issues in fusion plus the related needs for fuel and better superconducting materials. Just what I was looking for. I wish there was a similar article on the research and development in neighborhood scale fission reactors that are truly fail-safe, small scale, lower cost, and reasonably free from the current barriers of long term storage of "waste" products and protection from the possibility of diversion of nuclear materials by evil doers. If it's not already out there, maybe that is an article you could research and write.

***Paul S. Heller,*** *IN A '67*

## Fusion Ready for Prime Time

This article probably presents a more balanced description of fusion energy R&D than any other semi-popular article on the subject. Most pieces are breathless acclamations along the lines of "isn't-this-wonderful-it-will-save-the-world!" Although balanced, your article ends on a decidedly upbeat note I want to emphasize that there is not a shred of justification for the claims made by Hsu. He states that "the big science problems have all been solved." Not true. For example, it will not be known until ITER or SPARC operate in the 2030s whether a tokamak can even achieve a burning plasma (Q~5) or anything close to that, which is essential for a power reactor. JET, in 2021, could not even reproduce its highest Q results of 1997, despite a quarter-century of advances in supercomputers and AI which are supposed to resolve all of fusion's difficulties.

The last paragraph contains the standard fusion promoters' claims of reaching energy breakeven in the 2020s and putting electrical power on the grid in the 2030s — before ITER has even begun to operate with D-T. Contrary to Hsu's statement, the influx of venture capital will do little to promote real progress, which means increasing neutron production and Q. So far, this venture capital has only produced impressive new campuses and buildings to house experiments for CFS, General Fusion, Helion, TAE, and others. There is zero chance of fusion energy breakeven in the 2020s, except on Livermore's NIF which arguably has already achieved it. As for electricity production, the best that can be hoped for by 2040 is a modest demonstration of 5 to 10 kW(e) in an ITER module, while simultaneously consuming 300 MW(e), as I explained in an October 2021 article in the *APS Physics and Society*. A demonstration of power reactor feasibility (including all necessary reactor technologies) is at least 50 years away, and practical use at least 100 years away, if it ever occurs. You correctly quoted me to that effect near the beginning of the article.

Your description of ZAP experiments is upbeat, but the maximum neutron yield they have ever produced is 100 million per pulse, corresponding to 100 microjoules of fusion energy. The electrical energy input to the device is at least 100 kilojoules, nine orders of magnitude higher. This case brings up an issue that is pervasive in the fusion startup world — the absence of neutrons. Both D-D and D-T reactions produce neutrons, and the magnitude of neutron production is a vital indication of device performance. No neutrons means no fusion. The word "neutron" was not mentioned in your article, and it is also foreign to many fusion startups. (ZAP is a rare exception.) Whether they produce zero neutrons or some neutrons, or have never heard of neutrons, all the fusion startups claim that they will put electricity on the grid by the early to mid-2030s.

As for high magnetic field in tokamaks, that's essential for MIT-CFS only because it wants to make its reactor as compact as possible, and field strength can be traded off against reactor size. It can also be traded off against "beta," the ratio of plasma pressure to magnetic field pressure, which is expected to be only 1 percent in SPARC. In other words, MIT-CFS painted itself into a corner that demands it must strive for huge magnetic fields in order to survive. When they did achieve high field in a test, they declared it an essential breakthrough that will save civilization but nobody else needs it in the first place!

Despite the above carping, I enjoyed the article and thank you for quoting me accurately.

***Daniel Jassby, Ph.D.,*** *former principal research physicist at the Princeton Plasma Physics Lab*

## 2022 CONVENTION SUMMARY CONTINUED

From page 17.

alumni chapters, and review and recommend action on a proposal to establish alumni chapter awards.

The committee developed a list of recommendations for improvement of Alumni Chapters operations and will provide that to the EC and Director of Alumni Affairs. The committee recommended that the Director of Alumni Affairs select one award in each of five categories: collaboration with collegiate chapters, community engagement, member participation, overall outstanding chapter and most improved chapter. It also recommended that the EC establish an *ad hoc* **Alumni Chapters Committee** for the 2023 Convention.

The *ad hoc* **Diversity, Equity & Inclusion Committee** reviewed the current DEI Committee charter. Motions to expand the catalog card to track demographic data, include optional expanded gender options and race/ethnicity information, allow members to update their existing catalog cards, and to reinstate the DEI Committee at the 2023 Convention were accepted. Other recommendations covered structuring affinity groups to provide more inclusivity at Convention.

"Disability Accessibility" was recommended by the *ad hoc* **New Engineering Solutions for Tomorrow Committee** (NEST) as this year's NEST competition topic. The committee introduced NEST to Convention at an Information Session on Friday evening and offered advice and recommendations for program developers.

The *ad hoc* **Advisors Committee** reported on changes to the Advisor's Manual, the website and the Chapter Survey. The manual has not been updated since 2010. They proposed changes to advice on working with university administrations and removal of various redundancies on the advisor's website pages.

The *ad hoc* **Program Review Committee** reported on issues resulting from the 2018 Convention motion "to not allow a program just because it had an engineering name." Chapters were given five years to appeal, but because of COVID, no appeals were reviewed in 2020-21. A motion to extend the deadline for chapters to appeal the eligibility of programs through 2027 was approved. FL D and OH B were granted appeals of their computer science programs, and the data science program proposed by CA Psi was not approved. The committee reviewed 127 programs for eligibility, finding 50 programs to be eligible, which were all approved by the Convention.

The *ad hoc* **Image and Marketing Committee** divided into subcommittees: Poster and Publicity, Insignia, Recruiting Website, and Member Website. Entries from the poster contest were reviewed and two winners were selected. A t-shirt design competition was recommended, and updates to the *Pi Day* logo were suggested. Many issues were noted regarding the websites. A motion was made to continue I&M at the 2023 Convention.

The Resolutions Committee thanked the host chapter members, officials, generous alumni, recruiters, award winners, HQ staff, volunteers, and others for the many positive things that took place during the year. The Chair of the Resolutions Committee concluded his remarks to Convention with inspirational messages for chapter leaders to take back to their chapters.

Above: Dr. Lauren H. Logan, OH D '10, poses with Walter, the unofficial Convention mascot. He came from a dinosaur fair held at a neighboring convention hall.

Right: Convention delegates stand to applaud the passing of Convention business.

# ASSOCIATION BRIEFS

## ALUMNI ACTIVITY:
## 2022 CONVENTION

More than 20 ΤΒΠ Alumni Chapter members gathered in Knoxville, TN, to conduct Association business and socialize.

The top image shows a group of ΤΒΠ Alumni Chapter voting delegates with the Director of Alumni Affairs (far left) at the Knoxville Convention Center.

In the middle image, (left to right) is Director of Fellowships **Sally J. Steadman,** *WY A '69*; ΤΒΠ Executive Councillor **Joan M. Sciacca,** *CA M '87*; and ΤΒΠ past president **Sue L.R. Holl,** *CA L' 76*. Drs. Holl and Steadman are both ΤΒΠ Outstanding Advisors, 2021 & 2005, respectively.

In the bottom image, five former TN Alpha Chapter presidents join the 2022 president (center) for the Model Initiation during Convention (left to right): Jim Froula '67, Chirag Tailor '15, Mike Kennedy '86, Derrick Bailey IV '24, Alvin Jenkins '61, and Brent Weinberg '01.

## JOIN AN ALUMNI CHAPTER AND EVEN BECOME AN OFFICER!

**Tricia E. Gomulinski**, *SD A '98*, Director of Alumni Affairs works as a software/IT project manager for Teledyne Brown Engineering in Knoxville. Visit: www.tbp.org/?ACcontact or, contact tricia@tbp.org, to discuss the possibility of establishing a chapter near you.

## ALUMNI ACTIVITY:

## ST. LOUIS, MISSOURI ALUMNI CHAPTER SOCIAL

On October 11, the St. Louis (MO) Alumni Chapter met at Novellus restaurant to discuss the 2022 ΤΒΠ Convention. Chapter President, **Ildefonso (Al) Gonzalez, Ph.D., P.E.,** *MO Β '07*, attended Convention as a voting delegate and relayed to the chapter ideas and topics that were discussed. Energized by the experience, Dr. Gonzalez encouraged the chapter to leave the effects of COVID-19 behind and reorganize to grow the chapter.

The St. Louis Alumni Chapter held another chapter activity on Friday, October 28, at the Funny Bone Streets of St Charles comedy club.

Follow the chapter's Facebook page for more information and contact the chapter at: *STLAlumni@tbp.org*.

## ALUMNI ACTIVITY:

## TUCSON, ARIZONA ALUMNI CHAPTER EVENTS

In spring of 2022, the Tucson Alumni Chapter joined in a fundraising opportunity through Aramark at University of Arizona sporting events. TUSAC members participated by manning a concession stand and receiving a percentage of sales to donate. In addition, TUSAC alumni enjoyed a presentation and pizza party with Raytheon for the UofA (Arizona Alpha) student chapter. **Richard C. Damon,** *CA Θ '87*, (TUSAC VP and a colleague) presented on missiles and how they work.

Finally, **Walter D. McDonald,** *AZ Α '65*, held a career development presentation during AZ Alpha's ΤΒΠ Pi Day Meeting.

Thanks to Cynthia F. Burham, Ph.D., J.D., *TX A '05*, for submitting these event summaries. Contact the chapter at: *tbptuc@gmail.com*.


The St. Louis Alumni Chapter members at Novellus.

## STAY CONNECTED

Follow us on social media and tag us, so we can see your ΤΒΠ images using **#taubetapi**.

**INSTAGRAM:** instagram.com/taubetapiofficial/

**FACEBOOK:** facebook.com/TauBetaPiHQ/

**WORDPRESS BLOG:** taubetapiathq.wordpress.com/

**TWITTER:** twitter.com/TauBetaPi

**YOUTUBE:** youtube.com/c/TheTauBetaPiAssociationInc

## FRESHMAN STEM SCHOLARSHIPS:

Every year, six incoming college freshmen are awarded a Tau Beta Pi — SAE International Engineering Scholarship of $1,500 to pursue an engineering degree from an ABET accredited program. The 2022-23 recipients include:

**Connor Basham** (Monton, MD) - biomedical engineering at Dartmouth University

**Marc DiGregorio** (Gap, PA) - engineering at Madison University

**Julia Kehl** (Austin, TX) - mechanical engineering at Texas A&M University

**Kevin Murphy** (Lawrence Twp, NJ) - materials science & engineering at Carnegie Mellon University

**Emilie Steinberg** (Aventura, FL) - mechanical engineering at Duke University

**Sophie Xie** (Chicago, IL) - electrical engineering & computer science at University of California, Berkeley

# ALUMNI NOTES

Your fellow Tau Bates are interested in news about **you.**

ARIZONA BETA '21

## Dean Bower Sarra

Dean captured the 2021 Collegiate Championship at the U.S. National Baton Twirling Championships. He also won the titles of Grand National Champion in Men's Solo, 2-Baton, and 3-Baton. Dean works as an analyst at One Energy after graduating with a degree in mechanical eng'g from ASU.

CALIFORNIA LAMBDA '00

## Randy Bowersox P.E.

Randy has joined Gannett Fleming as the firm's hydropower market executive. He spent the last 15 years with the Northern California Power Agency and progressed from chief dam safety engineer to assistant general manager of generation services. Randy has M.S. and MBA degrees from UC Davis.

CALIFORNIA PI '85

## Luis R. León P.E.

Luis was selected as a 2022 Water Environment Federation Fellow, nominated by the California Water Environment Association. He is an associate vice president at AECOM, has 37 years of engineering and management experience, and earned his B.S. in civil eng'g from Northrop University.

CONNECTICUT ALPHA '22

## Megan He

Megan was among 18 recipients of the prestigious Churchill Scholarships for 2022-23. She graduated with a degree in environmental engineering and global affairs at Yale University and also received a certificate in energy studies. At Cambridge, her plans are to pursue a Ph.D. in environmental eng'g.

INDIANA ALPHA '06

## Anne A. Campbell Ph.D.

Anne works as an R&D associate in ORNL's Materials Science and Technology Division and is a member of the first fully female team to lead a meeting of The Minerals, Metals & Materials Society and the American Nuclear Society. She'll serve as technical chair of MiNES 2023 and general chair of MiNES 2025.

MASSACHUSETTS EPSILON '71

## Richard I. Mellitz

Richard received the 2022 Engineer of the Year Award at DesignCon 2022, a conference for systems design engineers in the high-speed communications and semiconductor communities. He is a Distinguished Engineer at Samtec cited for producing work that has changed the course of interconnect signal integrity.

MISSOURI BETA '97

## Lt. Col. Scott S. Preston P.E.

Scott recently completed three years commanding the U.S. Army Corps of Engineers - Tulsa District in Oklahoma. Now, he's the defense coordinating officer for FEMA Region 7 in Kansas City, MO, and has been serving for 25 years with tours to Germany, Korea, Iraq, Afghanistan, and Kosovo. He has B.S. and M.S. degrees from MO S&T.

NEW JERSEY GAMMA '72

## Bert J. Frattini

Bert recently retired from the Clark County Department of Aviation in Las Vegas, NV, after 31 years of dedicated service. As an airport engineer, he supervised facilities and engineering staff and participated in the planning, design, construction, and successful completion of numerous airport projects. His B.S. in ME is from NJIT.

NEW JERSEY GAMMA '20

## Ayushi K. Sangoi

Ayushi has been named one of 2022's Major League Hacking Top 50 — a list compiled each year of the organization's most inspiring community members. A researcher at NJIT, she earned her B.S. in biomedical eng'g, serves as NJ Gamma Chapter president, and was named a 2021 ΤΒΠ Fellow.

OHIO ZETA '84

## John K. Estell Ph.D.

John was elected for a one-year term as the vice president of Professional Interest Councils by the American Society for Engineering Education (ASEE) at the 2022 Annual Conference held in Minneapolis, MN. He is a professor of computer eng'g & computer science at Ohio Northern University and a 1984 ΤΒΠ Fellow.

Send items about civic activities, honors won, weddings, promotions, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to media@tbp.org. Material for publication must be received by February 1 for the Spring issue and May 1 for the Summer issue. Include name, address, chapter/class year, and email address or phone number. Thank you!

Hanna Wolf, OR Δ '21, and Mario Segura, OR Δ'22, top and bottom as grads. More information can be found at: *https://electerrotech.com/*

OREGON DELTA '21 & '22

## Hanna P. Wolf & Mario A. Segura

Hanna and Mario are both recent graduates of Oregon Tech, served as OR Delta Chapter president in successive years, and worked together as a team on the winning business venture Electerro, developing a solar and wind energy tree. This hybrid system had leaf-shaped photovoltaic panels and a vertical low-wind speed axis turbine at the top. The unique branching structures gave it the appearance of a tree. It also had a 400-watt battery system at the base of the tree. The Electerro prototype placed third in Catalyze Klamath and two months later, the pair won first place at Invent Oregon and the People's Choice Award, beating out all projects from all universities in the state! The Electerro project is currently on pause while the pair focuses on their new jobs. They are working on a design patent for their invention after realizing what was required to enter the market at the desired competitive level. Both are hoping to use their new careers to gain valuable experience for the strength and future of the company.

Hanna earned B.S. and M.S. degrees in renewable energy engineering, has passed her Fundamentals of Engineering exam in electrical engineering, and is now a renewable design EIT for HDR in Irvine, CA.

Mario graduated with a degree in mechanical engineering, was his college's graduate ceremony speaker, and now works as a mechanical systems design engineer at Virgin Galactic in Tustin, CA.

Finally, the most important news is that the two are engaged with plans to marry in July 2023! Congratulations.

OHIO IOTA '87

## Deborah J. Houdeshell P.E.

Deborah is the WRF Superintendent for the City of Canton (OH) and has been selected as a 2022 Water Environment Federation Fellow. She was nominated by the Ohio Water Environment Association, has been in the wastewater field for over 34 years, and has B.S. and M.S. degrees in civil engeering.

TENNESSEE ALPHA '98

## Jeffery C. Orsborn P.E.

Jeff's firm, Orsborn Engineering Group, celebrated its 15th anniversary in November 2022. With over 20 years of professional engineering, design, and project management experience, he has led the firm located in Charlotte, NC, since 2007. He earned his B.S. in civil engineering from UTK.

VIRGINIA DELTA '67

## Lewis F. Payne Jr.

L.F. was elected president of the U.S. Association of Former Members of Congress. He previously served as president of McGuireWoods Consulting, LLC, from 1998-2020, sits on several boards, and served as a member of the U.S. House of Representatives (1988-97) for the 5th District of Virginia.

WEST VIRGINIA ALPHA '75

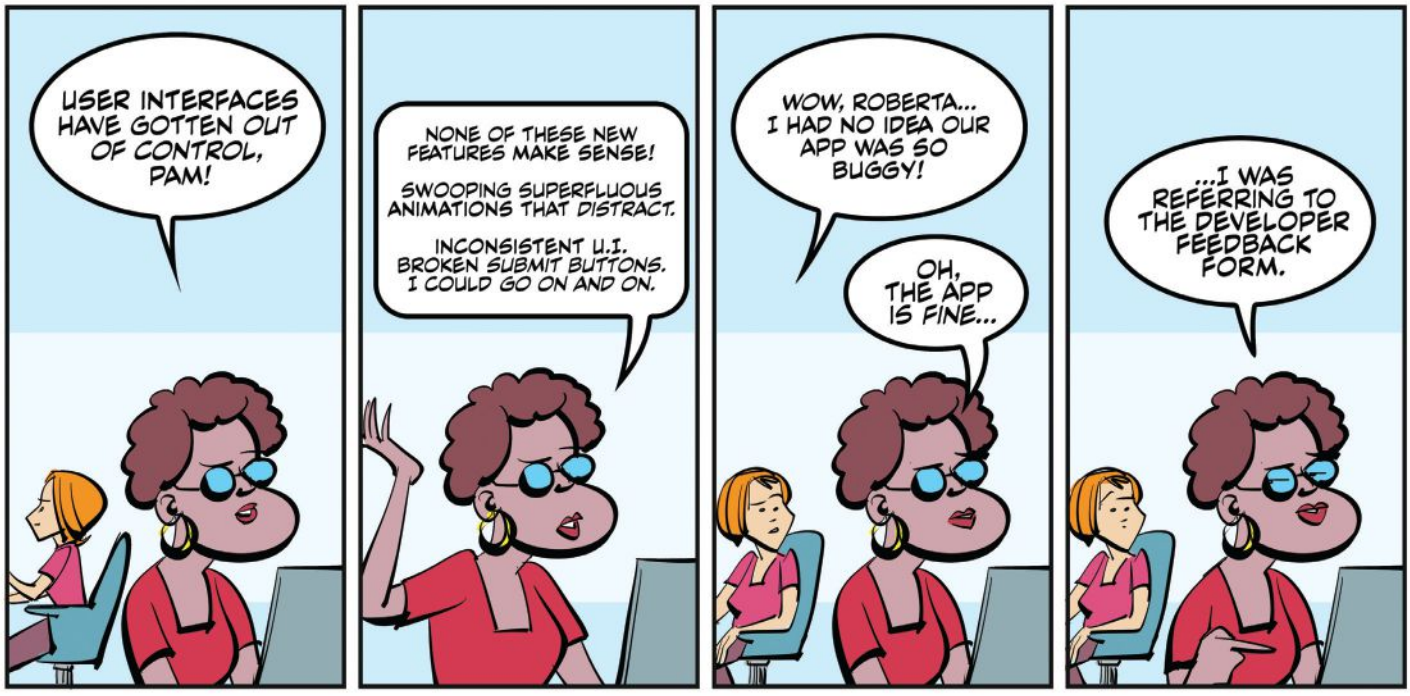
## John F. Gardner P.E.

John recently retired after 37 years of service from Emerson Electric Co. as president-global strategic accounts. He continues as a member of the Board of Directors for the Strategic Account Management Association and has joined the Executive Advisory Committee of WVU-Statler College of Engineering.

# TRUE TALES from the TESTBENCH...

Fellow engineers: the story you are about to read is *true*. Only the *names* have been changed to protect the guilty.

Words / Art:
Krishna M. Sadasivam
krishnadraws.com

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## We need *YOU*, to write for *The Bent*

The Editors of *The Bent* are frequently searching for well-written, general interest feature articles for the magazine. Many of you have the appropriate experience, are qualified, and capable of preparing such a feature.

Manuscripts can be1,000-3,000 words, and should be double-spaced and submitted as a text or MS Word document. Publishing cannot be guaranteed.

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## Need a Feature from a Back Issue?

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You can reach out to us at ***media@tbp.org*** with any other requests.

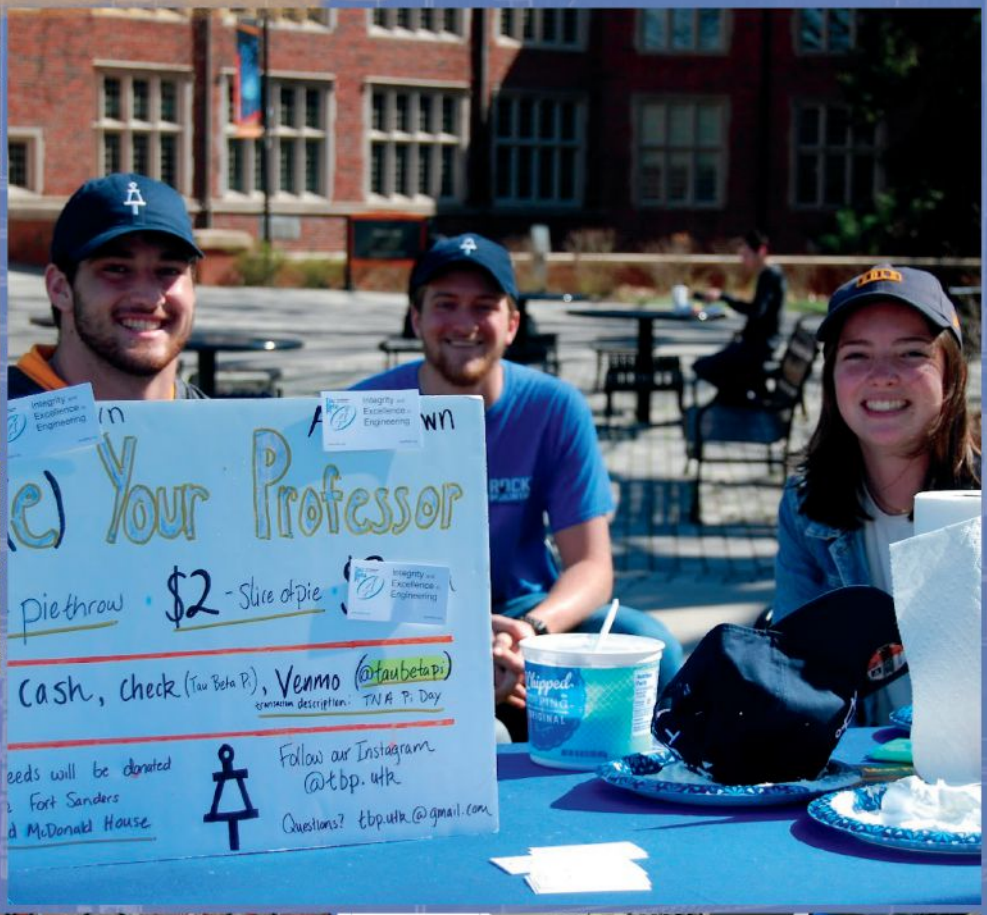
*Join us for the annual*

# TAU BETA PI DAY

March 14, 2023— wear your Bent or TBP apparel, participate in an activity, and post on social media in celebration of Pi Day with #taubetapiday!

3.14.23

www.tbp.org/?PiDay

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