



Too Creative to Quit

After a colorful career designing ground-breaking products, ESM alum Neil Tischler came out of retirement to knock out one more winner



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“When you shake up the world with something new, it’s fun,” declared veteran product design consultant Neil Tischler (M Eng, Engineering Mechanics, '68).

Tischler’s innate drive to exceed people’s expectations through product innovation

has driven the Penn State alum to design products that have had a real impact across a variety of industries.

Tischler’s portfolio includes designing tougher circulatory support devices in hospitals, more efficient gym treadmills, integrated flat panel monitors for the New York Stock Exchange, and even the world’s first portable 35mm electronic darkroom, which revolutionized photojournalism in the pre-Internet age.

Tischler started his engineering career in experimental and analytical stress analysis with the US Navy nuclear program, but shifted into product design consulting in 1980.

“In stress analysis you run a lot of numbers,” Tischler noted. “You build computer models of things. I switched. I became the person who makes it real.”

While he admits that consulting requires a strong stomach, because of the often-erratic work schedule and client demands, he said he wouldn’t trade the lifestyle for anything.

In fact, his love of the work pulled him out of retirement, when he was approached with a project too exciting to turn down.

In 2011, Tischler got a call from Nathan Monty, the founder of Convergent Dental, a dental equipment and technology start up. Monty’s team was working on a new kind of computer-aided laser that promised to revolutionize dental patients’ experiences, but they needed someone with Tischler’s experience to help make it viable.

After two years of development, the team arrived at a ground-breaking design for the first CO₂ dental laser system ever approved by the FDA for both hard and soft tissue ablation. The product has won several awards since its introduction, and Tischler couldn’t be prouder.

“This is a big time success; it was worth doing,” he concluded. “What a wonderful way to exit one’s career.”



Message from the Chair



Warm weather is upon us after a very long and cold winter. This semester's exciting events include our undergraduates' spectacular Rube Goldberg successes.

ESM has recruited three new faculty members in health monitoring, additive manufacturing, and nanotechnology—we will feature our new hires in the next newsletter.

Congratulations to Al Segal, recipient of the Penn State Engineering Alumni Society's Outstanding Teaching Award. Students repeatedly stated "how much he cared" about their successes. After seven years of greatly appreciated service as ESM's Graduate Officer, Al passed the baton to Mike Lanagan in May.

Following 46 years with ESM, Steve Fonash retired, becoming an active emeritus professor. He will continue to advise our nanotechnology center and programs. ESM's budget assistant, Carol Winkler, retired after 20 years of loyal and dedicated service and department head support coordinator, Debbie Hoy, retired following two years with ESM and over 25 years at PSU. We will truly miss them all.

Barbara Shaw and Bernie Tittmann received their 25-year Chairs this year. We thank Barbara for six years' service as ESM's undergraduate officer, culminating in a very successful accreditation visit. Gary Gray is now assuming her responsibilities. Bernie has been elected Senior Member of SPIE, and he has even spun out a new business.

Have a great summer!

Warm regards,

Judith A. Todd

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Steve Fonash



Debbie Hoy



Carol Winkler

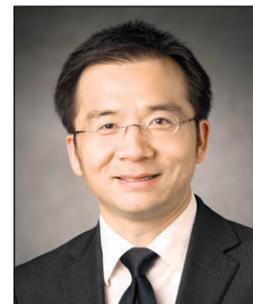
Faculty Spotlight

Dr. Tony Huang Named Fellow of Two Institutes

On Jan. 20, 2015, professor of engineering science and mechanics Tony Huang learned that he had been elected a fellow by not one, but two professional organizations.

The American Institute for Medical and Biological Engineering (AIMBE) elected Huang to join their College of Fellows, considered the top 2 percent of the nation's outstanding leaders, engineers, entrepreneurs, and innovators in medical and biological engineering. Concurrently, the Institute of Physics (IOP) recognized Huang by accepting his nomination to its highest rank, granting fellow status in recognition of his outstanding contributions to the profession.

"It is quite an honor to be recognized this way, and I'm very humbled," Huang said.



Graduate Spotlight

Chen Receives Dissertation Award

Yuchao Chen, a Ph.D. candidate working with Dr. Tony Huang, received a 2015 Penn State Alumni Association Dissertation Award. His research, focused on the manipulation of bio-particles with acoustic waves, is applied to biomedical applications that include isolation of tumor cells, enrichment of platelets, and fluorescence-activated cell sorting.

"I really want to thank Penn State University and Penn State Alumni Association for honoring me with this award," said Chen. "I also want to thank my adviser, Dr. Tony Huang, my Department Head, Dr. Judith Todd, as well as Dr. Al Segall. They all gave me great support during the application."



Undergraduate Spotlight

ESM Team Wins Regional Rube Goldberg Contest and places 3rd at Nationals

The challenge: to erase a chalk board in 20 or more steps.

ESM's Society of Engineering Science (SES) team chose the theme "Holidays throughout the School Year." At regionals in February, their efforts were not only judged first place, but also won the People's Choice Award.

Increasing the number of steps from 36 at Regionals to 45 at Nationals, the team had one flawless run and one touch on the second run, gaining them 3rd place.

"It was fun to build each step and then watch how all the steps came together at the end," said SES captain Greg Risser, a junior in engineering science.



Driven to Perform

Ameet Shah (E SC, '95) is yet another ESM alum with entrepreneurship in his blood. Upon graduation, he spent just one year working at General Motors Corp. before striking out on his own as an independent consultant.

In 2006, Shah founded Conigent—a company dedicated to helping other organizations implement software solutions for enterprise resource planning. As successful as Conigent became, in 2011 Shah found himself starting another company. The decision was prompted by a Business of Software conference in Boston.

“I think I was the only person at that conference who didn’t either own a software company or work for a software development company,” Shah explained. “When I came back, I said to myself, ‘I’m going to build a piece of software just to say that I did it.’”

A self-professed CrossFit workout junkie, Shah wanted an app to help track his performance. “What I quickly realized is that entering the data was cumbersome...and I couldn’t benchmark myself against others at my box.”

This prompted the idea to build a piece of software that would cater to the CrossFit market. Shah called it Wodify. Two and a half years after its launch, the app is used in more than 2400 gyms in 65 countries.



“It replaces the traditional whiteboard, spreadsheets, workout journals, manual class scheduling, and tedious billing process with a single digital solution that puts comprehensive management and athlete tracking tools into a single browser window or mobile app,” said Shah. “Athletes too can track their results with graphs, log their diet, and post results directly to Facebook and Twitter.”

Never satisfied to rest on his laurels, Shah is now reworking Wodify’s architecture. “It’s a big task” he admitted, “but absolutely necessary to ensure our product is the best that it can be.”

Engel Shares Career Lessons Learned

Dr. Renata Engel shared personal career stories and insights with students at this year’s “ESM Today” Graduate Research Symposium. Her autobiographical, keynote speech focused on the importance of both formal academic preparation and openness to emergent opportunities.



Dr. Engel is associate vice provost of online programs and professor of engineering science and mechanics and engineering design at Penn State.

“From being introduced to research while pursuing my undergraduate degree to working in an industrial R&D unit and then pursuing my PhD,” Engel said, “I was fortunate to augment my formal education and acquire professional skills through a multitude of diverse experiences.”

“Events such as ESM Today provide an excellent venue for graduate students to engage in two important aspects of the University: the creation of new knowledge, and the dissemination of knowledge,” continued Engel. “This Symposium enables students to hone their skills, and to communicate to their peers the importance, solution, and impact of cutting-edge research areas.”

Engel also believes that ESM Today provides our students, faculty, visiting scholars and members of the public with an outstanding overview of the richness of the research being addressed in the ESM department. “Providing students with a venue to articulate that richness is of particular value, professionally.”

“Developing the skills to deliver effective presentations is built throughout a career,” Engel pointed out, “so it is especially valuable for students to have as many opportunities as possible early in their careers.”

ESM RESEARCH HIGHLIGHTS



Lasers, squid and brain-computer interfaces featured in graduate student research

Student Research Showcased at ESM Today Graduate Symposium

Nine graduate students received cash prizes totaling \$3,000 for their paper and poster presentations at the 12th annual ESM Today graduate symposium, held on February 28, 2015. Topics included: thin films and their application to fingerprint analysis; ultrasonic phased array transducers and guided waves; lithiation of silicon nanowires; metamaterials; scanning acoustic microscopy, shape memory alloys, among many others.

First Place winners in the paper category were Abdon Pena-Francesch and Andrew Geronimo, for their papers “Thermal processing of recombinant squid proteins for materials fabrication” and “Cognition affects brain-computer interface utility in people with amyotrophic lateral sclerosis”, respectively. Amar Kamat took first place with his poster, “Laser sustained plasma nitriding of commercially pure titanium.”



“Presentation practice, feedback on research, collaboration opportunities with other professors and/or students within the department—the symposium is important for all these reasons,” said organizer Kamat, vice president of the ESM graduate student council. It is an exciting occasion for ESM faculty and students to get together and share ideas.”

ESM Today initially started out as a peer-review exercise organized as part of the seminar class by Professor Akhlesh Lakhtakia, where students presented their research and received feedback from other students. It then grew into a 1-day symposium, judged by ESM faculty members and a keynote speaker.

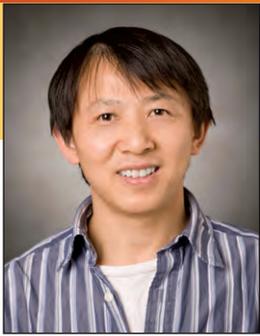
Graded on criteria such as scientific rigor, creativity of approach, delivery of talk, expected impact on society, visual aids, clarity of presentation, and responses to questions, ESM Today places a strong emphasis on communication skills

“I think this event is an excellent initiative by the Department to ensure that students acquire the necessary oral and writing skills, in addition to research skills, before they graduate,” said Kamat.



ESM Frontiers

It's Not Just About Mechanics Anymore



Sulin Zhang's research epitomizes the potential of engineering mechanics to revolutionize other disciplines—biology, electrochemistry and materials

What do lithium ion batteries, red blood cells, and 2D layered crystals all have in common? Each one of these materials has been deeply explored through the lens of engineering mechanics by Sulin Zhang, associate professor of engineering science and mechanics, yielding new and exciting discoveries.

"Mechanics as a discipline is very old," said Zhang. "Originating in ancient Greece, classical mechanics was pioneered by Isaac Newton more than 300 years ago. Many beautiful theories have been established. I'm always looking for new interdisciplinary problems that I can solve with the latest mechanics tools."

"While industry is capable of resolving traditional mechanics problems," Zhang noted, "only at a research institution like Penn State, in a department like ESM, are there opportunities to collaborate with others to tackle the most interesting, interdisciplinary challenges."

"The ESM department has been very supportive," he explained. Since he arrived at Penn State in 2007 as "a pure computational person," Zhang said he appreciated opportunities "to start my own wet lab, and to collaborate constantly with people in different departments. It's been wonderful"

For instance, Zhang partnered with biomedical researchers to explore the effects of malaria on red blood cells. By applying his mechanistic modeling techniques at the molecular scale, the team determined why malarial infection caused red blood cells to become stiff and sticky. With this knowledge, Zhang hopes that new anti-malarial molecular agents can be developed.

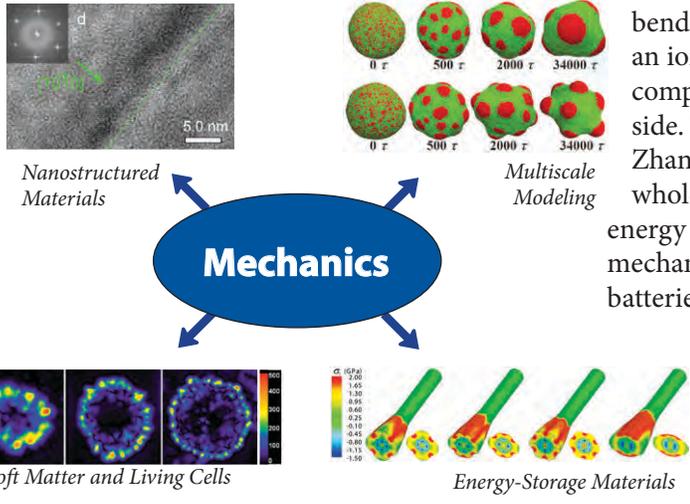
"In the development of nanoparticles as diagnostic and therapeutic agents, we're asking some very fundamental

analyses," Zhang explained, "to achieve both physical accuracy and computational efficiency."

Zhang's models yield valuable insights into the dynamics of material failure—"still a bottleneck for battery design." Zhang's team is currently studying the behavior of electrode materials, which promise to improve charge capacity and cyclability radically in lithium ion batteries.

Sometimes his observations yield paradigm-changing insights, such as when he discovered that bending nanowires causes an ionic flow from the compressed to the tensioned side. This discovery led Zhang's team to explore "a whole new class of mechanical energy harvesters." Imagine mechanically recharging your batteries by repeated bending.

It's discoveries like this that keep Zhang excited about the never-ending applications of engineering mechanics to other fields.



questions," he said. "How would we design the size, shape, and surface chemistry to better target diseased cells? We think all these factors play very important roles."

Principles of mechanics are extremely useful, according to Zhang, for filling knowledge gaps in disciplines such as biology and electrochemistry. Of particular value is Zhang's multi-scale modeling approach. "We link quantum mechanical calculations, molecular dynamics, coarse-grained modeling, and continuum-level



Dr. Sulin Zhang and Dean Amr Elnashai at the College of Engineering Ice Cream Social



Message from Your Alumni Society Chair

Congratulations to the winners of this year's Penn State Regional Rube Goldberg Competition and 3rd place National Champions.

Our own Society of Engineering Science (SES) team included three Junior and two Sophomore E SC majors, and six first-year engineering students.



Winners of this year's Penn State Regional Rube Goldberg Competition and 3rd place National Champions.

In an effort to assist our ESM students' development of well-rounded interdisciplinary backgrounds, integrated with real world experiences, our Board is working with the Department to establish a mentoring program.

As I mentioned in my Fall message, many Alumni respondents to the last survey indicated interest in working with current students. Similarly, in a recent survey of students, almost all respondents indicated a desire to work with an Alumni mentor.

Students are particularly interested in gathering professional perspectives and real-world advice, as well as pointers on how to best sell their E SC major to potential employers.

Alumni can really help our students and our Department to spread the word to employers on the benefits of an interdisciplinary engineering science background. ESM is working to set up a process to help kick-off this mentoring program. As always, we welcome any help from our Alumni base in meeting this challenge. In addition, to assist ESM Alumni interested in interacting with fellow graduates, efforts are being made to compile an up-to-date searchable online Alumni database.

The Board would like to welcome Jonathan Zuk, E SC '13 as our newest member.

Finally, congratulations to Shawn Keebaugh and Mukul Dixit —ESM's Early Career Recognition Awardees for 2015.

Rick Schutz
(E SC, '72)

Is your firm looking to recruit world-class engineers trained in the ESM department?

The **2015 ESM Recruitment Mixer** will be held September 16, 5:30-7:30pm in the EES Lobby. There is no charge for companies to attend. For more information, please contact Melissa at mus41@psu.edu.

SAVE THE DATES!

Engineering Alumni Tailgate
September 19, 2015
Penn State vs. Rutgers

ESM Alumni Tailgate
Homecoming,
October 10, 2015
Penn State vs. Indiana

Contact ESM

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