

John Longenecker in the control console of the Master Oscillator Room in the Livermore National Laboratory at the National Ignition Facility, a facility Longenecker & Associates helped support during construction. Photo credit: Longenecker & Associates.



ESM ENGINEERING
SCIENCE AND
MECHANICS

CONNECTIONS

Spring 2018



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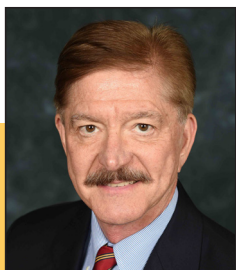
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Supporting the Next Generation of Engineers in the Nuclear Industry

ESM alumnus John Longenecker ('71 E MCH, '73 M.S. E MCH), is putting his time—and money—into the future of the nuclear industry.

For nearly 30 years, **John Longenecker** and the company he founded have been helping to solve some of the toughest problems in the U.S. nuclear weapons complex and commercial nuclear power industry.

But as his company, Longenecker & Associates, has grown from a small technical consulting firm to a company that plays a key role on projects from coast to coast, Longenecker is increasingly dedicating his time and money to address what is perhaps the nuclear industry's most significant problem of all— attracting, training, and retaining the next generation of leaders.

“One of the most important things we can do is support students and young professionals in engineering fields, particularly those who are interested in pursuing careers in the nuclear industry,” said Longenecker.

Today, most of Longenecker & Associates' work is with the U.S. Department of Energy (DOE), supporting efforts to clean up the Cold War and Manhattan Project environmental legacy and managing the current nuclear weapons stockpile.

“What we've always tried to do at the company is give back. We target the industry segments we care about as they support our nation's future, particularly on the national security and national energy fronts,” said Longenecker.



Longenecker pictured with ESM student scholarship recipients. Photo credit: Longenecker & Associates.

Longenecker noted that half of all DOE-funded workers—federal employees and contractors—will retire by 2020. A very real human capital cliff is looming for the industry.

That's why Longenecker began supporting ESM students with scholarships a decade ago, support he continues annually. Likewise, Longenecker & Associates supports more than a dozen annual scholarships for graduate and undergraduate students through the Roy G. Post Foundation, which encourages students to pursue careers focused on the safe management of nuclear materials.

“We can and must do more as an industry if we're going to have impact and attract and retain the next generation of leaders,” said Longenecker. “It all comes back to the people, and I believe strongly in enabling students to succeed, just as I was given that chance.”



PennState
College of Engineering

**ENGINEERING SCIENCE
AND MECHANICS**

Message from the Chair



ESM's exciting year culminated with graduation on May 4, 2018. This year, 52 percent of our students are going directly to graduate schools in the U.S., and to Aachen University in Germany, to study engineering science; electrical, materials, and mechanical engineering; medicine; and education. Forty-eight percent will start careers in industry, government, and the private sector.

On the same day, we learned that Akhlesh Lakhtakia had been awarded an Evan Pugh Professorship, the highest honor that the University can bestow on a faculty member. Only 71 faculty have received professorships since 1960, 29 of whom are still actively teaching and pursuing research. Congratulations Akhlesh!

ESM is also delighted to congratulate Jian Hsu on his promotion to full professor, Associate Professor Ibrahim Ozbolat for receiving tenure, and four PSEAS awardees: Chuck Bakis – Premier Research Award; Gary Gray – Outstanding Advising Award; Melissa Fink – Outstanding Staff Award; and Abigail Dodson – Young Alumni Achievement Award.

Our faculty recruitment program was successful beyond expectations, with four new hires: Associate Professor Parisa Shokouhi and Assistant Professors Andrea Arguelles, Christopher Kube, and Jacques Riviere. Watch out for more news in fall 2018.

Have a wonderful and relaxing summer!

Judith A. Todd

Judith A. Todd



Akhlesh Lakhtakia



Jian Hsu



Ibrahim Ozbolat



Melissa Fink

Faculty Spotlight

Varadan/Nanowear Receive Multiple Awards for Textile-based Nanosensor Technology

Cofounded by Distinguished Professor Emeritus Vijay Varadan, Nanowear Inc. recently received five awards for its first-of-a-kind, noninvasive wearable textile undergarment, SimpleSense, that can remotely monitor congestive heart failure (CHF) in patients, following CHF-related hospitalization. SimpleSense captures and transmits CHF data to a cloud-based environment, providing access and updates to medical professionals for assessment of patient health and progress.

Nanowear won the Health and Wearables category at the 10th annual SXSW Accelerator Pitch Event, was named Innovation Champion of the Accenture HealthTech Innovation Challenge, took the grand prize in the Philips Wearables Challenge, and received the MedTech Innovator Execution Award and the Virginia Shimer Rybski Memorial Award at The MedTech Conference.



Graduate Spotlight

Truong Receives Two Awards at College of Engineering Research Symposium (CERS)

Ph.D. candidate Christine Truong took first place in the CERS 2018 morning presentation session for her paper titled "Stereoscopic Particle Shadow Velocimetry," and won second prize in the Art in Science competition.

Truong's research at Penn State's Applied Research Laboratory develops particle shadow velocimetry for flow-field imaging, including stereoscopic, multiplanar, and volumetric imaging. Such diagnostic tools advance our understanding of complex and turbulent flow fields and of fluid mechanics.

Truong also received a 2017-2018 Longenecker & Associates Scholarship, is president of the ESM Graduate Student council, and co-organized ESM Today 2018, where she took first place in the Art in Science Exhibition.



Undergraduate Spotlight

Stutzman Serves as Spring Student Marshal

Christopher Stutzman ('18 E SC, minor in engineering mechanics, and 3.98 GPA), was selected as the engineering science student marshal for the College of Engineering's spring commencement ceremony on May 4.

A Schreyer Scholar, Stutzman completed a thesis titled "Multi-Sensor Investigations of Optical Emissions and Their Relations to Directed Energy Deposition Processes and Quality." He was also secretary of the Society of Engineering Science (2017-2018), a member of Tau Beta Pi, the recipient of numerous scholarships, and tutored students in chemistry, math, and physics. Stutzman will pursue a doctoral degree in engineering science and mechanics at Penn State beginning in fall 2018.



Faust Named Outstanding Engineering Alumna



Barbara Covolus Faust ('64 E SC), retired program manager from Lockheed Martin, was honored as one of 12 Penn State alumni who received

a 2018 Outstanding Engineering Alumni Award.

Faust was a pathfinder as the first woman to graduate from Penn State with a degree in engineering science (E SC). Since then, she has served as a role model for future generations of engineers through her commitment and service to industry, outreach, and community.

"From the time I was a child, engineering was the only field I ever seriously considered," said Faust. "Because I liked so many different things, the multidisciplinary nature of the engineering science curriculum really appealed to me."

Following graduation, Faust joined General Electric (GE) as an engineer in the highly selective Space Technology Engineering Program in the company's

Missile and Space Division. She became the first woman to complete the program.

After a 33-year career working in the aerospace industry, primarily on defense-related programs at GE, which evolved into Martin Marietta, then Lockheed Martin, Faust retired in 1998 as manager, technology assessment programs.

Early in her career, Faust also began her life-long activities to encourage young women to pursue STEM careers through active participation in the Society of Women Engineers (SWE) programs in its Philadelphia Section. She served multiple terms on the section's Executive Council and held positions at the regional and national levels. She is a SWE Fellow and Life Member.

In 1984, Faust joined the Engineering Science and Mechanics (ESM) Industrial and Professional Advisory Council and later served on the Penn State Engineering Society (now known as the Penn State Engineering Alumni Society) Board of Directors from 1987 to 1996, as well as on the Penn State Women in Engineering Program Advisory



Board from 1989 to 1992. In 2007, she joined the newly formed ESM Alumni Advisory Board and currently serves as chair of its Recruitment and Retention Committee, working to attract honors-quality high school and undergraduate students to the E SC program.

Today, Faust spends approximately half her time as a volunteer and board member of the Pennridge FISH Organization that provides food, clothing, and financial assistance to low-income households within the Pennridge School District.

Faust lives in Perkasio, PA, with her husband, Jerry. She has three step-children, six grandchildren, and one great-grandchild.

In Memoriam



Jean Landa Pytel, former assistant dean for student services and global programs and ESM associate professor, passed away on March 15, 2018.

"The College of Engineering family is deeply saddened by the passing of our colleague and dear friend," said Anthony Atchley, senior associate dean of engineering. "Jean had a profound and lasting impact on the undergraduate student experience."

Pytel joined ESM in 1979 as an assistant professor. Prior to her retirement in 2013, she served as assistant dean for student

services and global programs since 1994, as well as an ESM associate professor.

Pytel was a member of the Faculty Senate for 24 years; an administrative fellow to the provost; faculty adviser for the Penn State Society of Women Engineers; adviser to the Engineering Undergraduate Council and Engineering House; and board member of the Faculty Staff Club, where she served as president from 2001 to 2002.

She was a member of the Commission for Women (1986-1989) and held memberships in numerous University-wide and College-wide committees, task forces, and boards. In 2000, Pytel was one of the inaugural recipients of

the Achieving Woman award from the Penn State Commission for Women. In addition, Pytel was a member of the American Society of Engineering Education and served as chair of its International Division (2011-2013). She will be missed by us all.

ESM Alumni, Spread the News!

We always love hearing about the successes of our alumni.

If you have a great story to share, let us know so we can help spread the good news! Submit your news to alumnirelations@esm.psu.edu!

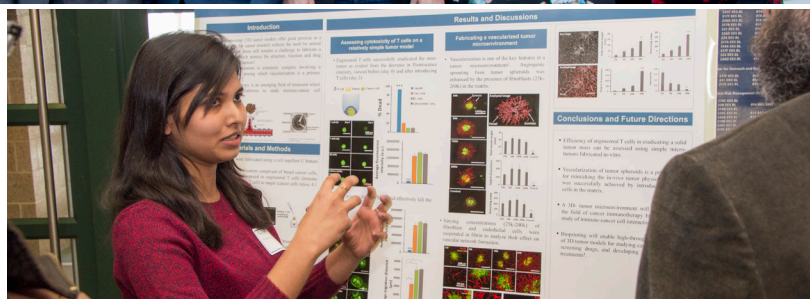


ESM Students Shine Bright at 15th Annual Research Symposium

High-temperature epoxy for resin transfer molding. Mimicking neurotransmitter release in chemical synapses via hysteresis engineering in MoS₂ transistors. Low-frequency, sub-wavelength lamb wave reflector using a boundary-condition-based design approach. Integration of 2D materials on glass. ESM Today 2018 had it all when it came to outstanding student research.

The 15th Annual ESM Research Symposium was held on February 10 in the EES Building and showcased the innovative research and work of 35 undergraduate and graduate students. Approximately 65 people attended this year's event, which included a total of 25 oral/paper presentations and 10 poster presentations. ESM Today, once again, featured an Art in Science exhibition where eight students displayed their research using a single slide showing one impactful image with an accompanying caption.

The event, organized by the ESM Graduate Student Council, gives students the opportunity to present their work through oral and poster presentations to peers, colleagues, and faculty; exchange ideas across the various research disciplines; and hone their presentation skills. Presenters were required to explain their work in a way that is easily understandable to both engineers and scientists who are not specialists in



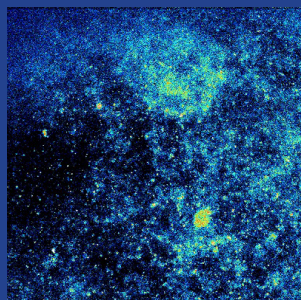
a presenter's discipline. ESM faculty and students served as judges, and \$3,800 in cash prizes were awarded.

Oral/paper presentations were split into two groups, with first prize in Group 1 going to Monika Hospodiuk for her paper titled "Bioprinted Pancreas-On-A-Chip Model for Drug Screening in Diabetes Therapy." First prize in Group 2 went to Kerim Moncal for his paper titled "In Situ Bioprinting of Bone Tissue Constructs."

Madhuri Dey took home first prize in the poster competition with "Fabrication of a Vascularized Tumor Microenvironment for Immunotherapy." Christine Truong and Andrew Arnold captured top honors in the Art in Science exhibition with "Particle Shadow Velocimetry" and "Brownian Trees on Etched SiO₂," respectively. Additional winners can be found [here](#).

The day's events also included an opening keynote speech from Joseph Rose, Paul Morrow Professor in Engineering Design and Manufacturing. His presentation was titled "Seeking the Edge to Achieve Extraordinary Engineering Success."

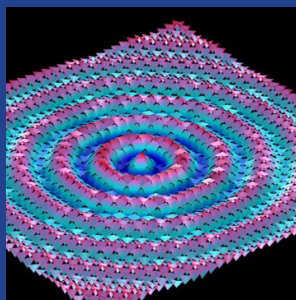
Art in Science Exhibition



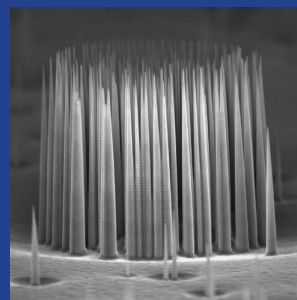
Particle Shadow Velocimetry
Christine Truong
First Place



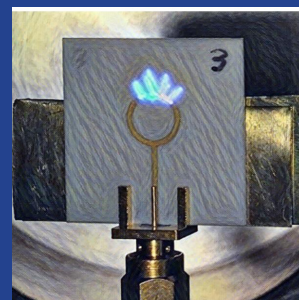
Brownian Trees on Etched SiO₂
Andrew Arnold
First Place



The Discontinuous Butterfly Effect
Ravi Kedarasetti
Third Place



Silicon Nanowire Forest
Daniel Schulman
Third Place



Plasma Crown
Zane Cohick

ESM Frontiers

CISP is on the Cusp of Something Great



New faculty member and CISP director Todd Palmer is bringing innovation to a legacy industry . . . and he's just getting started.

In August 2017, **Todd Palmer** joined the ESM faculty as professor and director of

the Center for Innovative Sintered Products (CISP)—and he brought with him a clear vision to revitalize the Center and advance it to the forefront of the metal powders industry.

“Over the next several years, it is my intent to rebuild the CISP facilities for the next generation of powder processing technologies,” said Palmer. “The focus will move towards innovative fundamental research in both the characterization and processing of components from powder feedstocks. Emphasis will be on solving grand challenges, particularly in advanced manufacturing.”

The facilities within CISP encompass a range of powder characterization, powder preparation, compaction, and sintering capabilities that are used within numerous industries. While the Center and its facilities were originally intended to support the powder metallurgy and metal injection molding industries, the growing use of metal powders, particularly in additive manufacturing (AM), make it a highly relevant and unique capability, not only for Penn State, but also for industry and government.

As powders and powder-based feedstock are increasingly used for advanced and additive manufacturing, training the next generations of scientists, engineers,



Left: Ph.D. candidate Andrew Iams demagnetizes an additive manufacturing powder feedstock sample prior to performing rheological and charge measurements on a powder rheology system.



Right: Graduate student Marissa Brennan uses newly refurbished metallography equipment in CISP to analyze additively manufactured metallic materials.

students, and the technical workforce in powder processing and handling becomes critical. Consequently, CISP will team with both industry associations and other Penn State campuses to develop and deliver new education and training programs in these areas.

“One of my current priorities is to build bridges with Penn State DuBois, which offers a bachelor of science degree in engineering – applied materials option, with a focus on powder metallurgy,” said Palmer. “I’ve already started working with their professors to establish new collaborations and bring innovation to a legacy industry.”

Palmer, whose background is in welding and joining, also intends to branch out into other growing areas, such as powder rheology, that are a logical fit for CISP and would increase its capabilities and offerings as they relate to AM.

“We already have a head start since rheological testing capabilities have

been integrated into CISP since the ’90s, with more equipment upgrades planned,” said Palmer. “My goal is to take best practices from the metal powders industries and apply them to metal additive manufacturing of components for a broad spectrum of industries.”

In the fall, Palmer will investigate mathematical and numerical modeling of powder interactions, and he’s currently ensuring CISP’s labs and equipment are up for the task. He has already renovated the heat treatment, powder characterization, and metallography labs; installed a new quenching dilatometer; and is in the process of renovating the powder preparation and processing areas.

“I’m excited for CISP’s future and the contributions we’ll be able to make as we create new knowledge through fundamental and applied research, and train students, practicing engineers, and the technical workforce in the powder metallurgy industry and beyond,” said Palmer.



Message from Your Alumni Society Chair

During our spring 2018 meeting, the ESM Alumni Society selected the winner for the Spring 2018 Early Career Recognition Award. After consideration of several

very qualified candidates, Abigail Dodson was selected to receive the award. Notice will go out shortly for applications for the spring 2019 award. If you know an ESM alum whom you believe is deserving of the Early Career Award, we encourage you to submit their name for consideration.

If you recall, the alumni society initiated a mentoring program in fall 2017, with 27 students and 16 mentors participating. During our spring meeting, we performed a lessons learned from the first eight months of the program and determined that we will make some adjustments to the program for fall 2018. While the details will be worked

out over the summer, if you would like to volunteer as a mentor, please contact Tina Storms, coordinator for alumni, development, and advancement at 814-867-1569.

The ESM Alumni Society is comprised of alumni who have a broad range of backgrounds and careers. The purpose of the society is to foster connections among ESM alumni and current ESM students and faculty to positively influence the educational experience of students, expose students to the world of the practicing engineer, and assist the ESM department in promoting alumni outreach. If you would like to be a part of the ESM Alumni Society, please contact Tina Storms in the ESM office.

Rich Smith ('73 E MCH)

Spring 2018 Early Career Recognition Award Winner



Abby Dodson ('12 E SC), product engineer at Lear Corporation, is the Spring 2018 Early Career Recognition Award recipient. Dodson is a founding member of the Lear Young Professionals group that engages Lear's younger employees with networking and

development opportunities and provides outreach to local communities. She has brought invaluable industry and young leadership perspectives to ESM as a member of the ESM Alumni Society Advisory Board since 2012, and to the Penn State Engineering Leadership Alumni Society as president since 2014. The Early Career Recognition Award recognizes alumni who graduated in the past 10 years and have distinguished themselves at work, in academia, and/or in their community.

2018 ESM Career Fair



Recruit world-class engineers trained in engineering science and mechanics.

September 12, 2018

5:30 p.m. – 7:00 p.m.

EES Building Lobby

*There is no cost for companies to participate. Reserve your table today. Contact Tina Storms at tms4@psu.edu or 814-867-1569.

Contact ESM and Stay in Touch

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