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PennState
College of Engineering

**ENGINEERING SCIENCE
AND MECHANICS**



Starr named 2017 Outstanding Engineering Alumnus

ESM alum John Starr ('90 E SC) never planned where his career would go, but staying open-minded to opportunities and helping others led to his own success.

Having grown up on a small farm, Starr took his first college course after ninth grade and pursued engineering because of the advice of his high school calculus teacher.

"I had no idea what major to choose," Starr recalls. "She told me to select engineering, but I knew nothing about it. She said, 'Don't worry—it's for people who are good at math and science. You'll enjoy it.'"

Starr entered the Engineering Science program and focused on engineering mechanics after attending an ice cream social hosted by the University Scholar's Program to learn more about the major—and because "no teenage boy could pass up free food."

He began his career as a mechanical engineer at Westinghouse, where he worked on the manufacturing of submarine missile launch systems and designed propulsion systems.

Starr joined medical device startup Respironics in 1992, and earned seven patents for inventions. By 1996, Respironics had put him through Carnegie Mellon University Tepper School of Business for his MBA and gave him a series of leadership roles in product development and new business development.

In 1999, Starr was recruited to become Director of Operations for FreeMarkets, a dot-com software company that offered global supply



Dean Elnashai presenting Starr with his award.

management solutions. In 2004, software company Ariba acquired FreeMarkets and asked him to build and lead a global organization of deployment teams to grow their cloud software business.

When Ariba was acquired by SAP in 2012, Starr was named Senior Vice President of Solution Delivery Centers wherein he currently leads 2,000 IT professionals who provide software services to SAP customers across the planet.

"I've always believed you don't have to have it all figured out. Take it one day at a time, do your very best, help people, stay positive, have fun every day, and opportunities will continue to come," says Starr.

Message from the Chair



At graduation on May 5, 27 students and their families celebrated bringing our total number of 2016-2017 graduates to 41 students. Six students double majored in chemistry, mechanical engineering (2), music technology, and physics

(2); and 26 students completed 29 minors, (biomedical engineering-2, electrochemical engineering-1, engineering mechanics-12, mathematics-4, music technology-1, nanotechnology-4, physics-4, and Spanish-1). This year, 55 percent of our students will continue on to graduate school and 45 percent will go into industry and the private sector. It was a very happy event.

Congratulations to Bruce Gluckman, associate director of the center for neural engineering, who has been promoted to full professor.

ESM welcomes Sarah Jones as our new undergraduate program assistant and Andrea Choperena as our new engineering support specialist in the Center for Innovative Sintered Products.

We have been busy recruiting new faculty this semester and are pleased to announce that Christian Peco, an expert in computational mechanics, has accepted an assistant professor position. Christian applies his research to biomechanics, materials science, and nanoscale phenomena. Watch out for more hiring news in our next issue!

Enjoy your summer!

Judith A. Todd

Judith A. Todd



Bruce Gluckman



Sarah Jones



Andrea Choperena



Christian Peco

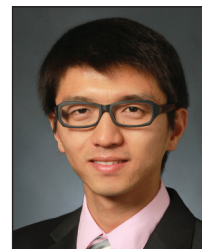
Faculty Spotlight

Cheng Makes Forbes 30 Under 30

In January, assistant professor Huanyu (Larry) Cheng was named to the 2017 Forbes 30 Under 30 in Science list. Forbes identified the 28-year-old Cheng among young, outstanding scientists from a wide variety of fields, from astronomy to mathematics to neuroscience.

"I am deeply honored by this award, and to be included with such distinguished scholars," said Cheng. "In addition to recognition for my past achievements, it's inspiring, as I feel I have a long way to go to live up to the standards set by previous recipients."

Cheng's research focuses on mechanics design and manufacturing of biologically-inspired electronics with applications in robotics, biomedicine, and energy. Recent efforts by Cheng center on developing a durable and robust wearable technology platform that could be used for sensing and monitoring various physical or chemical signals, which could prove useful for diagnosing diseases.



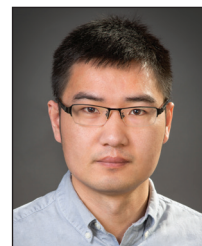
Graduate Spotlight

Mao Awarded Funding for Industrially Sponsored Research

Zhangming Mao ('17 Ph.D. ESMCH) received the Thomas and June Beaver Fund Award which supported his research on acoustofluidics and 3D acoustic tweezers.

Mao optimized and extended the functionalities of acoustofluidic devices and systems to benefit a wide variety of applications in biomedical research and engineering. His 3D acoustic tweezers platform has great potential for 3D printing of cells and tissues for bio-applications.

The fund, awarded by the Graduate School, provides financial assistance to full-time graduate students performing industrially sponsored research in connection with the Ben Franklin Partnership Fund Program.



Undergraduate Spotlight

Trowbridge Serves as Spring Student Marshal

Michael Trowbridge was the student marshal for the engineering science baccalaureate degree program at the College of Engineering's spring commencement ceremony on May 5. Trowbridge received concurrent bachelor of science degrees with Honors in engineering science and mechanical engineering, and a minor in engineering mechanics. He graduated with a 4.0 GPA.

Trowbridge, a Schreyer Scholar, completed a thesis titled "Comparative Assessment of Cold Spray, Laser-Assisted Cold Spray, and Direct Metal Laser Sintering of Ti-6Al-4V." He was also the recipient of numerous scholarships and awards including the Evan Pugh Scholar Award as both a junior and senior.

This summer, Trowbridge will complete an internship at Boeing Research and Technology where he'll perform composite research. In the fall, he will pursue a graduate degree in mechanical engineering at Penn State to research smart materials and structures for future rotorcraft or spacecraft.



Alumni News and Recognition



Photo: University of Michigan

Ellen Arruda ('85 E SC, '88 M.S. E MCH), professor of macromolecular science and engineering at the University of Michigan, was elected a member of the National Academy of Engineering—one of the highest professional distinctions accorded an engineer. Academy membership honors those who have made outstanding contributions to “engineering research, practice, or education.” Arruda was recognized “for pioneering research in polymer and tissue mechanics and their application in innovative commercial products.”



Photo: Kevin Spear/Orlando Sentinel

Bill Easter ('93 M.S. E SC), CEO at Semplastics and X-MAT, has developed a disruptive material—“coal-core composite”—that may outperform metals and plastics, and significantly improve cars, computerized devices, and other manufactured goods.

Ventsel says goodbye to Penn State



Liliya Ventsel, instructor in engineering science and mechanics, retired from Penn State following the spring semester. Ventsel spent 14 years with the department and was the primary instructor for E MCH 316: Experimental Determination of Mechanical Response of Materials, which introduced undergraduate students to the mechanical test methods

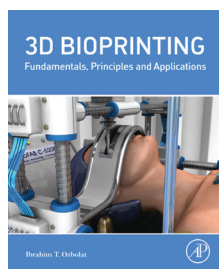
used to evaluate the mechanical behavior of engineering materials and structural components.

“From day one, Liliya was a blessing, eagerly embracing running the laboratory course and all of the nitty gritty details that go with it,” said Albert Segall, professor of engineering science and mechanics, who worked closely with Ventsel. “More importantly, she also had the same gusto for the multitude of students that took the class over the years, making the labs a fun and interesting experience. She will be dearly missed by me and the many students yet to come.”

Attention ESM Alumni!

What's the latest with you?? Have you received a promotion? Won an award? Got married? Let us know so we can share the good word with our alumni and peers. Submit your news to alumnirelations@esm.psu.edu!

Faculty Honors/Awards



Ozbolat authors new 3D bioprinting book, receives ENGINE grant
Ibrahim Tarik Ozbolat, associate professor, authored a new book titled

“3D Bioprinting: Fundamentals, Principles and Applications,” published by Elsevier (Academic Press). The book provides the latest information on 3D bioprinting, including: raw materials, processes, machine technology, products, applications, and limitations.

Ozbolat and Dino Ravnicek, staff physician at Penn State Hershey, were awarded a College of Engineering ENGINE grant for their proposal, “Development of the First 3D Bioprinted Pancreas-on-a-chip Model for Drug Screening.”



Lanagan named Dean's Fellow
Professor Michael Lanagan was named one of six inaugural Dean's Fellows in the College of Engineering for his

pioneering contributions to dielectric and piezoelectric research and his outstanding teaching.

Lakhtakia named RSA Fellow

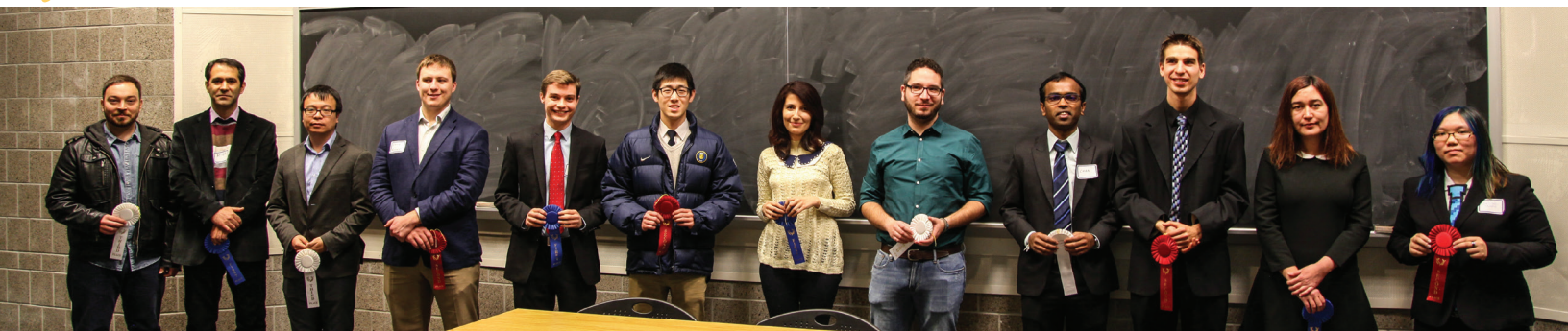
Akhlesh Lakhtakia, Charles Godfrey Binder Professor in Engineering Science and Mechanics, was named a Fellow of the Royal Society for the Encouragement of Arts, Manufactures and Commerce for the societal aspects and impacts of his research and his commitment to positive social change through innovative engineering.

ESM professors awarded multidisciplinary seed grants

Cliff Lissenden and Bruce Gluckman were part of two different research teams that were awarded College of Engineering Multidisciplinary Research Seed Grants. Lissenden's project is titled “Engineering a giant meta-material: A band-stop seismic/blast filter to shield critical civil infrastructures.” Gluckman's project is titled “Towards Distributed Wireless Implants for Large-Scale Optogenetics.”

Demirel introduces CRAFT Center

Professor Melik Demirel introduced his new Center for Research on Advanced Fiber Technologies (CRAFT) at the Programmable and Wearable Molecular Composites Workshop on March 21 in State College. CRAFT is developing new functionalities in fibers to revolutionize the global textile industry.



ESM Students Display Outstanding Work at 14th Annual Research Symposium

ESM Today 2017, the 14th annual Engineering Science and Mechanics Research Symposium, was held February 11, and once again, showcased the incredible research, work, and talent of our amazing students. 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.

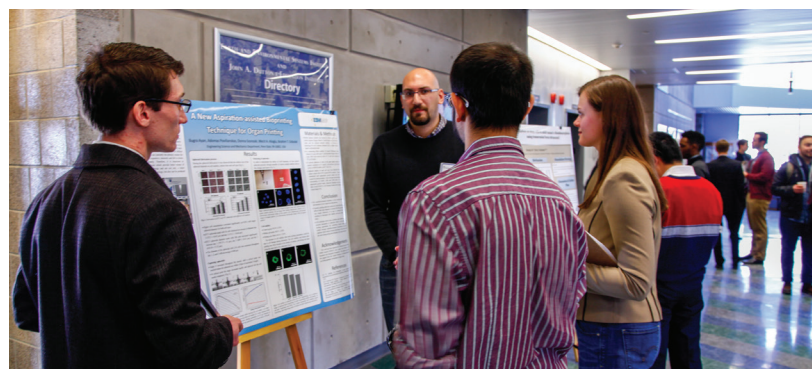
Approximately 75 people attended this year's event at the EES Building on the University Park campus, and 21 students gave a total of 14 oral presentations and 10 poster presentations. Presenters were required to explain their work in a way that is easily understandable to both engineers and scientists who are not specialists in a presenter's discipline.

This year's event included undergraduate student presenters and also featured an exciting new category—Art in Science—where seven students displayed their research using a single slide showing one impactful image of their research along with a short caption. ESM faculty and students served as judges, and \$3,600 in cash prizes was awarded.

Oral presentations were split into two groups, with first prize in group 1 going to doctoral candidate Fatemeh Bahari for her paper titled “Estimation of Hidden Dynamics in Non-Linear Systems for Predicting Sleep-Wake States.” First prize in

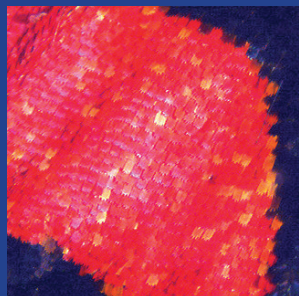
group 2 went to Michael Trowbridge, a senior in engineering science, for his paper titled “Implementation of Preston-Tonks-Wallace Plasticity Model for the Cold Spray Process.”

Amir Aref Laleh took home first prize in the poster competition with “Porous Carbon Materials for Electrochemical Capacitors.” Sema Erten captured top honors in the Art in Science exhibition with “The Butterfly Effect.”

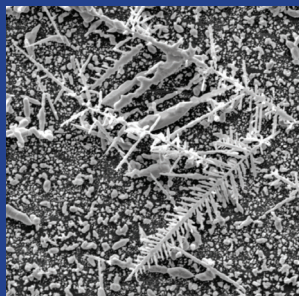


The day's events also included an opening keynote speech from Vijay Varadan, ESM alumnus and Distinguished Professor Emeritus of Engineering Science and Mechanics. His presentation was titled “Nanosensor systems. Nanomedicine and wireless platform for monitoring and control of cardiovascular diseases and neurological disorders – Role of ESM education and research for successful career pathways.”

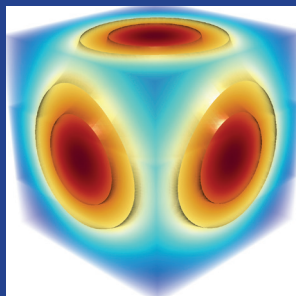
Art in Science Exhibition



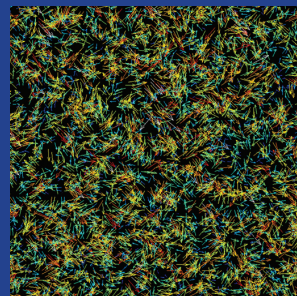
The Butterfly Effect
Sema Erten
First Place



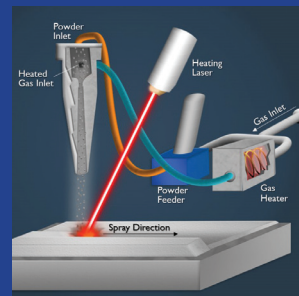
Silver Crystal
Pine Tree Leaves
Huihun Jung



Overset Isosurfaces
Justin Kauffman



Phantom Vorticity
Christine Truong



Laser-assisted
Cold Spray
Michael Trowbridge



ESM Frontiers

ESM Bids Farewell to Long-time Professors

With a combined 67 years of dedicated service to the ESM department, Professors Ashok and Tittmann retire from Penn State.



Bernhard Tittmann



S. Ashok

Bernhard Tittmann and S. Ashok, two long-time ESM professors, retired from Penn State at the end of the spring semester.

Tittmann joined the department in 1989 and was named Schell Professor of Engineering Science and Mechanics. He was

the director of the Engineering Nano Characterization Center, group leader of the Center for Acoustics and Vibration's acoustic characterization of materials group, a faculty member of the Materials Research Institute, and an affiliate faculty member of the Department of Materials Science and Engineering.

He published 475 papers, had 3,355 citations, and coauthored 20 books.

In his 28 years with the department, Tittmann supervised 36 graduate theses. He also received a Penn State Engineering Alumni Society (PSEAS) Outstanding Research Award in 1998.

He is a member of the American Ceramic Society; the American Physical Society; ASM International; the American Society for Nondestructive Testing; the Materials Research Society; the American Society of Mechanical Engineers; the Acoustical Society of America (ASA); the Institute of Electrical and Electronics Engineers (IEEE); the International Society for Optical Engineering; the American

Association for the Advancement of Science; Sigma Xi, the Scientific Research Honor Society; and Sigma Pi Sigma, the Physics Honor Society.

Tittmann is also a Fellow of ASM International, ASA, IEEE, and was awarded a Senior Fulbright Fellowship in 1999.

Tittmann will become an ESM professor emeritus. He will move to southern California where he intends to continue his research in collaboration with the University of California, Santa Barbara.

"I have loved working at Penn State, and teaching and working with students," said Tittmann. "I will miss their eager faces, inquiring minds, and their enthusiasm about research. I will also greatly miss my colleagues and the excitement that comes from working with them."

Ashok joined Penn State in 1978 as an assistant professor of engineering science after receiving his Ph.D. in electrical engineering from Rensselaer Polytechnic Institute. He was promoted to full professor in 1987.

He initiated and pursued experimental research in a number of areas including semiconductor interfaces, ion implantation and plasma processing, process-induced effects in semiconductors, semiconductor defect engineering, hydrogen in silicon processing, photovoltaics, and radiation effects. Ashok also developed and taught several engineering science graduate courses related to semiconductors.

During his 39 years with the department, Ashok supervised 37 graduate theses and mentored countless graduate students. He received a PSEAS Outstanding Research Award in 1983.

Ashok is a member of the Materials Research Society (MRS), IEEE (senior member), the Electrochemical Society, and the American Vacuum Society. He was the founder and co-organizer of the Symposium on Defect Engineering on Semiconductors held triennially at the MRS Spring Meetings from 1992 to 2007.

Ashok published approximately 230 papers during his academic career. He has also participated in numerous national and international conferences, and given seminars and conducted short courses at numerous research labs and universities worldwide.

Ashok will also become an ESM professor emeritus and plans to pursue academic activities by serving on thesis committees and giving talks in his areas of expertise at various institutions. He will split his time between State College, PA, and Chennai, India.

"It's been a wonderful experience, and there's nothing better than having the position I had and helping students succeed," said Ashok. "The years have gone by so quickly and it feels like I joined the department just the other day. Penn State provided me with a great opportunity to do what I love—perform open-ended research and educate students."



Message from Your Alumni Society Chair

Work is continuing by members of the alumni society to develop and launch the ESM mentoring program (discussed below) in the fall of 2017. The program

will pair students and alumni with common interests and experiences to provide guidance to students in topics selected by the students. To assist in launching the program, we are in the process of developing a short promotional video to highlight key aspects of the program. Look for information about the video in late summer or early fall.



Melissa Showalter

If you are not aware, Melissa Showalter left her position as coordinator for alumni, development, and advancement in ESM to take a job in the College of Engineering Development Office. She has been an invaluable asset to the PSESMAS in too many ways to name. We thank Melissa for all of her efforts,

congratulate her on her new assignment, and wish her nothing but the best going forward.

The ESM Alumni Society Board is comprised of 15 to 20 alumni who have a broad range of backgrounds. The society's mission is to "Advance the department's world-wide recognition, specifically in recruiting and retaining diverse, quality students; preparing these students for the work environment; and promoting the understanding, attractiveness, and perceived value of engineering science and mechanics in industry, research, and academia."

We meet twice a year to see how we can best fulfill our mission. If you would like to be a part of the ESM Alumni Society Board, please contact ESM Alumni Relations at alumnirelations@esm.psu.edu or 814-865-4523.

Rich Smith ('73 E MCH)



ESM Mentoring Program

Make the connection! Meet your match!

Launching in fall 2017, the ESM mentoring program will match both undergraduate and graduate students, based on area of interest and industry type, with a mentor alumnus/alumna who can help them succeed in their academic and professional lives.

If you are interested in mentoring a future engineer, please contact ESM Alumni Relations at alumnirelations@esm.psu.edu or 814-865-4523.



2017 ESM Recruitment Mixer

Recruit world-class engineers trained in the ESM department.

**September 13, 2017
5:30 p.m. – 7:00 p.m.
EES Building lobby**

Reserve your table today. Contact ESM Alumni Relations at alumnirelations@esm.psu.edu or 814-865-4523.

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ESM website: www.esm.psu.edu | PSESMAS website: www.esm.psu.edu/alumni | PSESMAS operations: alumnirelations@esm.psu.edu

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