Joyce Wong (BME, MSE); Muhammad Zaman (BME, MSE) and Xin Zhang (ME, ECE, BME, MSE); Associate Professors Douglas Densmore (ECE, BME); Ahmad 'Mo' Khalil (BME) and Xue Han (BME); and Assistant Professor Lei Tian (ECE).

Boeing hosted this year's FOE program, centered around cutting-edge developments in four areas: Advanced Manufacturing in the Age of Digital Transformation; Engineering the Genome; Self-Driving Cars: Technology and Ethics; and Blockchain Technology.

The symposium joined Coskun with other early-career engineers who are advancing their own technical areas in a variety of engineering disciplines. In workshops, discussions and networking events, participants exchanged ideas, networked and hopefully developed future collaborations.

"I am particularly enthusiastic about identifying new interdisciplinary engineering problems through this event and starting new projects," she says.

—LIZ SHEELEY

BU-Harvard Team Wins $1.2M NSF Grant to Improve Women's Reproductive Health

A multidisciplinary team of researchers from Boston University and Harvard University is working to address women's reproductive health challenges with the help of a $1.2M, four-year grant funded by the National Science Foundation through its Smart and Connected Health program.

The BU-led project will leverage machine learning and artificial intelligence to develop an integrative approach to enable personalized reproductive and fertility predictions and prescriptions. The researchers will also focus on improving the understanding of socio-economic disparities in the use of infertility treatment services.

The BU team is led by Principal Investigator (PI), Professor and Director of the Center for Information & Systems Engineering Ioannis Paschalidis (ECE, BME, SE). He is joined by Associate Professor Alexander Olshevsky (ECE, SE) and School of Public Health Professor Lauren Wise (Epidemiology).

The sub-award recipient on this grant, Harvard University brings the expertise of co-PI and Assistant Professor of Environmental Reproductive and Women's Health Shruthi Mahalingaiah, who holds an adjunct appointment at the BU School of Medicine.

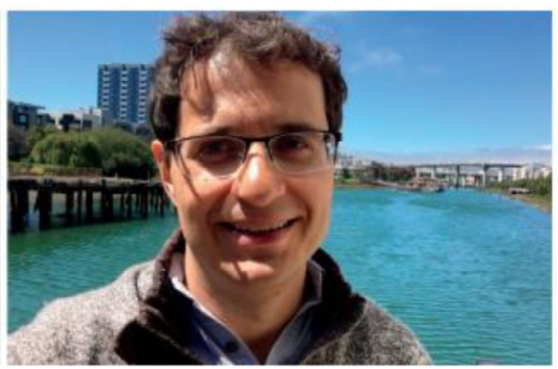
"This project is an exciting illustration of the tremendous potential modern data science methods have to leverage the increasing availability of data and impact our health and well-being," Paschalidis says.

"With the emergence of personalized medicine, aided by data and algorithmic advances, we now have the ability to learn from available data and develop personalized predictions and intervention recommendations for each individual. The overall goal is to enable people to optimize health before conception, identify modifiable determinants of fertility and reduce health risks during pregnancy and beyond."

The researchers will develop an integrative approach to enable personalized reproductive/fertility predictions and prescriptions using distributed, privacy-preserving algorithms trained using multiple data sources. The algorithms will combine information from self-administered surveys, electronic health records and personal health records to produce highly accurate personalized predictions and prescriptions or recommendations, enabling individuals and their physicians to make the most appropriate, individualized healthcare decisions.

"It's one thing to be able to predict one thing will happen, but the important question is, what do you do and how do you improve the condition of the individual?" Paschalidis adds. "By bringing together this truly multidisciplinary collaboration of clinicians and engineers, this project brings the deep, diverse expertise and requisite resources for advancing the health and well-being of women."—MAUREEN STANTON

Researchers (from left) Paschalidis, Olshevsky



PHOTOGRAPH OF PASCHALIDIS BY CYDNEY SCOTT

Bishop Lands Grant from Sony to Develop Magnetometer

Professor David Bishop (ECE, Physics, MSE, ME, BME) has been awarded a $100,000 research grant from Sony Electronics to further develop a novel, ultrasensitive and contactless magnetometer to be used for anything from location sensing to heart monitoring.

"Our technique is about 100 to 1,000 times more sensitive than what others have done before," Bishop notes. "Once developed, this could be used for biosensing and perhaps become a mobile monitoring tool for patients because of its portable size."

This award will allow Bishop and a doctoral student in his lab, Josh Javor, to build iterations of the device and deliver prototypes to Sony. Together, the teams can continuously develop the device to work toward a commercially viable product that is user-friendly and can be easily manufactured.

Bishop's process is different because it uses microelectromechanical systems—or MEMS—an inexpensive, chip-scale technique that could significantly advance the field.

"Sony has been a leader in not just consumer electronics, but also medical devices," Bishop says. "It was an honor to be selected to receive this award, and I'm excited to work with their team to hopefully create a robust and reliable technology."—LIZ SHEELEY

Professor David Bishop

Professor Xin Zhang

PHOTOGRAPHS BY CYDNEY SCOTT

Zhang Receives Accolades for Innovative Research

Professor Xin Zhang (ME, ECE, BME, MSE) has received many accolades for her years of research using metamaterials; most recently, she has been elected a fellow of the American Physical Society (APS) and received a 2019 Innovation Award from the Institution of Engineering and Technology (IET) for Emerging Technology Design.

She was elected an APS fellow for her research and educational initiatives using microelectromechanical systems and metamaterials to address a wide range of important problems in areas ranging from energy to healthcare to homeland security.

The IET Innovation Awards recognize the most pioneering engineering and technology innovations across sectors such as energy and sustainability, transport and healthcare.

Zhang was chosen from more than 360 entries for her recent work in developing a new metamaterial that can improve magnetic resonance imaging (MRI) quality and decrease scan time (see story on page 9).

"It is an honor to receive international recognition from the IET and I am immensely proud of my team at Boston University," she says.

And I am honored to be elected a fellow of the APS. I have such respect for the important work that the APS does, and am especially pleased to be part of the industrial and applied physics community, which helps the society take advantage of the evolving opportunities in the practice and application of physics."

Zhang's work in metamaterials has been able to influence a wide range of fields because of its adaptability. A metamaterial's properties are derived from its shape, not its material, and, by manipulating the shape, Zhang can develop new ways to manipulate non-visible waves and fields such as sound, magnetic fields, microwaves and infrared radiations.

Zhang's APS election adds to her already impressive list of appointments. She is a fellow of the Institute of Electrical and Electronics Engineers, the American Institute for Medical and Biological Engineering, the American Association for the Advancement of Science, the Optical Society of America and the American Society of Mechanical Engineers, and an associate fellow of the American Institute of Aeronautics and Astronautics.

In 2018, she received Boston University's Innovator of the Year Award as well as the College of Engineering's Charles DeLisi Award and Distinguished Lecture.

—LIZ SHEELEY