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Jeffrey Nanzer to use NSF CAREER Award to develop dynamic antenna arrays for radar and remote sensing

Jeffrey A. Nanzer of the Michigan State University College of Engineering will use a five-year, $500,000 National Science Foundation Faculty Early Career Development (CAREER) Award to develop dynamic antenna arrays for radar and remote sensing.

Nanzer is the Dennis P. Nyquist assistant professor in the MSU Department of Electrical and Computer Engineering.

“My goal is to create new methods for remote sensing and radar by using collections of sensors that are wirelessly coordinated. These include sensors on autonomous vehicles, on swarms of unmanned aerial vehicles, or on groups of cubesats,” Nanzer said. “Today there is a big focus on improving individual sensors, which is a platform-centric point-of-view. By distributing the sensing across many small platforms, our research will enable greater sensing capabilities than a platform-centric model can provide.”

John Papapolymerou, MSU Foundation Professor and chair of the MSU Department of Electrical and Computer Engineering, said he was pleased that Nanzer’s innovative and groundbreaking work on microwave wireless systems and radar technology has been recognized with the highly prestigious award.

“Not only will this work advance the state of art in the specific field of study and allow a plethora of new applications that will benefit society, but it will also educate the next generation of electrical engineers providing them with the competitive advantage needed in today’s world,” Papapolymerou added.

For more on Nanzer’s research, "CAREER: Exploring Dynamic Antenna Arrays for New Radar Sensing Modalities,"
see the NSF abstract.

Nanzer said he will investigate new wireless techniques that make use of dynamic elements.

“The only cost-effective way we can sustain new advances in radar, remote sensing and communications, is by getting away from today’s platform-centric models, and exploring what distributed arrays of low-cost sensors are capable of,” Nanzer continued. “When the platforms are in motion, as is the case with UAVs or autonomous vehicles, there is the potential to open up new paths of exploration. We think this has the capability to create new techniques for wireless systems.”

Nanzer noted that the applications for his research are far-reaching.

“By creating new sensing methods and improving on existing ones, our research can help satellites better sense the earth and its atmosphere, improve target discrimination in military radar, and provide greater safety for autonomous vehicles,” he said. “Beyond this, my CAREER award will enable me to teach new array concepts and established antenna array theory under a new perspective of distributed arrays, which is very exciting to me,” he added.

Nanzer is the 15th faculty member of the College of Engineering to receive an NSF CAREER Award since 2010 and the second in 2018. NSF CAREER Awards support junior faculty who exemplify the role of teacher-scholars through outstanding research and education. It is among NSF’s most prestigious honors.

It is the second year in a row Nanzer has won major national recognition. In April 2017, he received a prestigious Young Faculty Award (YFA) from the Defense Advanced Research Projects Agency (DARPA). He is utilizing that two-year, $400,000 award to create technologies enabling separate, small wireless systems to collaborate as a single system.

He joined Michigan State as a faculty member in the fall of 2016 as a member of MSU's Electromagnetics Research Group. His research focus is on microwave and millimeter-wave remote sensing, millimeter-wave photonics, radiometry, radar, antennas, and electromagnetics.


Nanzer is an associate editor for the IEEE Transactions on Antennas and Propagation, the chair of the IEEE Microwave Theory and Techniques Society (MTT-S) Microwave Systems Technical Committee (MTT-16), a member of the IEEE Antennas and Propagation Society (AP-S) Standards Committee, and a member of the AP-S Education committee.

He is a graduate of MSU Engineering, receiving a bachelor’s degree (2003) in electrical engineering as well as a bachelor’s degree (2003) in computer engineering. He received MS (2005) and PhD (2008) degrees in electrical engineering at the University of Texas at Austin.

From 2009-2016, he worked in the Johns Hopkins University Applied Physics Laboratory, where he created and led the Advanced Microwave and Millimeter-Wave Technology Section for advanced radar and communications technology.

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