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**MSU electrical engineer named finalist in Naval Research Concept Challenge for research on 3D printing**

A Michigan State University electrical engineer is a national finalist in the concept challenge hosted by the U.S. Chief of Naval Research.

Shanelle Foster, an assistant professor of electrical and computer engineering, is supporting the U.S. Navy and Marine Corps of the future with her research on 3D printing of magnetic cores used in electrical motors.

Her work was among nine projects highlighted at the Naval Future Force Science and Technology Expo in Washington, D.C., in July.

U.S. Chief of Naval Research Rear Admiral David J. Hahn introduced Foster as a finalist in the concept challenge. “The visionary ideas that we received from Challenge participants will enable us to get out in front of the rapid, ever-accelerating technology development and deployment cycle,” Hahn said.

“We were challenged to provide something for the Navy and Marine Corps that they haven’t thought of yet,” Foster noted.

She hopes to help the Navy eliminate the logistical difficulties of needing spare motors and generators in the middle of the ocean.

“In spite of the technological advancements in 3D printing, there is still a critical gap in understanding the functional and structural characteristics of deposited iron alloys for the design of magnetic cores in electrical machines, transformers, and other magnetic assemblies. While powder-based additive manufacturing processes have been used to produce fully-dense metallic parts, little has been done to develop functional 3D printed magnetic components,” she
said.

Foster hopes to develop magnetic cores using additive manufacturing technology by investigating material magnetic properties. Her research will use binder-jet printing and vacuum sintering to process iron alloys, microscopy to measure the grain size and texture changes as a function of processing parameters and physical properties measures.

See the list of the other finalists and read the Navy’s official announcement, "Spotlighting New Technology Ideas at the Naval S&T Expo."

Shanelle Foster joined the Department of Electrical and Computer Engineering at Michigan State University in January 2014 as an assistant professor. She is one of two directors in MSU’s Electrical Machines and Drives Laboratory. From 2009 to 2013, she served as project manager of the same laboratory. Her research interests include analysis, control, reliability and manufacturability of rotating and linear electrical machines and drives. She received three degrees from Michigan State University, all in electrical engineering (BS ’96, MS ’98, PhD ’13).

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