

USU Electrical Engineer Receives Major Grant for 'Smart' Antenna Design | College of Engineering

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News Release — LOGAN, UTAH, April 5, 2018 — A professor of electrical engineering at Utah State University received a [\\$750,000 grant](#) to further develop an antenna technology that could revolutionize the mobile communications industry. The grant was provided by the National Science Foundation's Small Business Innovation Research [Program](#).

Dr. Bedri Cetiner invented a new antenna technology known as multifunctional reconfigurable antennas, or MRAs. These software-defined 'smart antennas' can adapt to detect a signal's direction, frequency and polarization — or shape. The design is inspired by the chameleon which changes the color of its skin in response to environmental cues.

USU's Dr. Bedri Cetiner invented the multifunctional reconfigurable antenna, or MRA. These 'smart antennas' can adapt to better detect a signal's direction, frequency and polarization.

"Software-defined smart antennas determine the wireless channel characteristics and signal properties and adapt their functionalities to better transmit or receive a particular signal," said Cetiner. "This allows them to use much less power and makes the entire system more efficient."

The new antennas are a necessary step toward the next generation of mobile communication.

"We currently use 4G technology," said Cetiner. "5G is not an incremental improvement of 4G. It's a completely new paradigm in wireless communication. 5G will allow higher data rates and larger coverage areas, but will require more sophisticated antennas. The current antenna technology cannot handle the demands of 5G."

MRAs are made up of multiple elements connected via switches. Depending on which switches are active, the

array of elements give the MRA the shape it needs to better detect a signal.

USU patented Cetiner's MRA technology and then licensed it back to a startup company that he founded three years ago. That company, i5 Technologies, Inc., will use the NSF funding to develop commercial-grade prototypes to demonstrate MRA equipment to potential buyers. Cetiner says the demand for sophisticated antennas will expand significantly in the coming years. Potential customers — including Ericsson, Samsung and Nokia — are already investing in new 5G technologies. Modernized antennas, says Cetiner, will make the next advancements in mobile communication possible.

"The antennas are everything," he said. "We like to use the analogy that what your eyes provide for you, the antenna provides to a wireless device."

Cetiner has demonstrated that MRAs outperform legacy antennas in data transfer rates and coverage capacity. With MRA technology, he adds, 5G wireless systems could function more efficiently and use with fewer cell towers, known as base stations.

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