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Antennas and Wireless Propagation (AWP) Lab Present Research at Colloquium

January 5, 2017



Dr. Sungkyun Lim, Associate Professor in the Department of Electrical Engineering at Georgia Southern University and his students in the Antennas and Wireless Propagation (AWP) Lab presented their research to the College of Engineering and Information Technology (CEIT) as part of the Department of Electrical Engineering's Research Colloquium series.

Recently, research on electrically small antennas has been considered for networked wireless communications and sensing applications, including environmental monitoring, intelligent transport systems, aircraft, and satellite systems.

Specifically, Dr. Lim has developed novel design methodologies for electrically small antennas and tested them with digital radios and ad hoc networks in real-world communication environments.

Since wireless sensors have to run under serious energy constraints, the maximization of power transfer with high-gain antennas is critically important for low-power networked communication and for increasing propagation range. As an example, information retrieval from sensors and communications among networked radios requires connectivity across difficult environments with limited power. Consequently, Dr. Lim designed supergain arrays with close spacing between the elements and with electrically small antenna elements.

To explore applications of this work, [Georgia Power/Southern Company](#) awarded a Georgia Research for Academic Partnership in Engineering (GRAPE) grant to Dr. Lim for research on "Wireless energy harvest for self-powered wireless sensors using dissipated electromagnetic fields." Dr. Lim and his research team are studying how wireless sensors can automatically be charged wirelessly using Electromagnetic fields and using electrically small supergain arrays.

Dr. Lim has been awarded a second GRAPE grant by Georgia Power/Southern Company for the project "Realization of cyber-security/intrusion risk-free zone for IEEE 802.15-based wireless sensor technologies by controlling the propagation of RF signals." The goal of the second GRAPE project is to achieve physical cyber security for wireless sensors in power plants/buildings by controlling radio frequency (RF) signals using directive antennas instead of omnidirectional antennas.

Dr. Lim received a grant from [AGCO](#), a company that designs, manufactures and distributes agricultural equipment. The project, "The GNSS competitive assessment," investigates satellite wireless communication systems for better performance in tractors and combines.

Dr. Lim has expanded implementation of a number of electrically small antennas to aircraft applications, passive/active RFID tags & readers, size miniaturization of VHF communication systems. Dr. Lim has also broadened the research to include the use of metamaterials such as Electromagnetic Band-Gap (EBG) structures and Artificial Magnetic Conductor (AMC) ground planes for better performance with electrically small antennas.