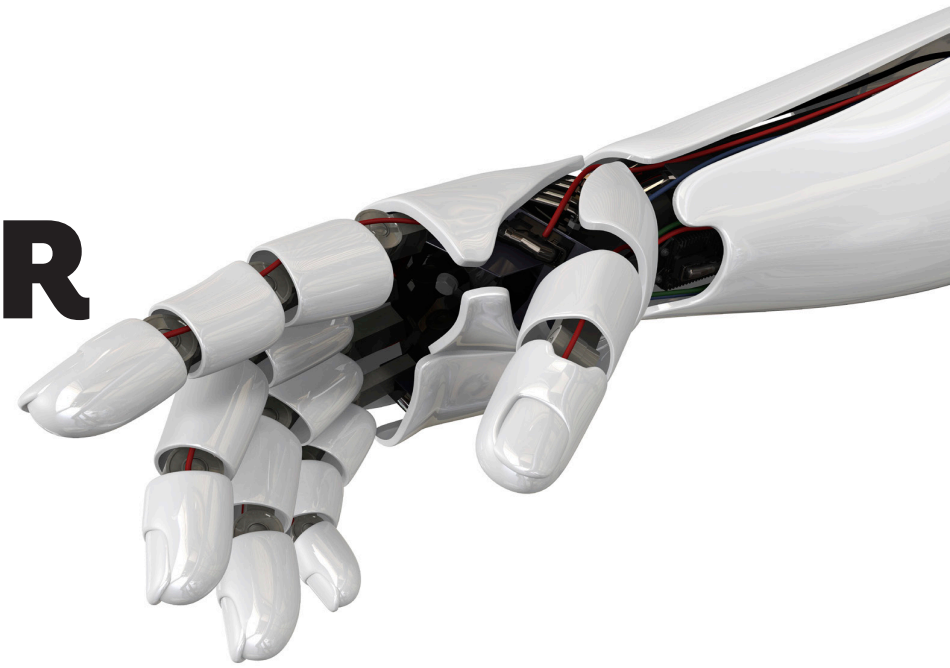
ECE SEMINAR

Department of Electrical and Computer Engineering

November 21, 2016
3:00pm- 4:00pm
Egr Bldg 1, Rm N308

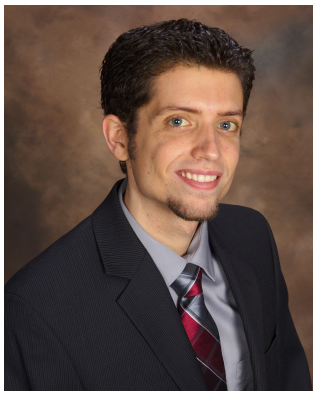


Dr. Joshua M Kovitz

Postdoctoral Scholar, University of California Los Angeles

Towards a Connected Universe: Antenna Systems for Advanced Spacecraft and Emerging Wireless Services

The idea of wireless connectivity within modern society is undergoing a significant transformation. What originally started out as a single point-to-point electromagnetic interface has now evolved to ecosystems of wireless devices providing services such as GPS location, internet access, or even cyber-physical systems. As new services are envisioned and new devices are added to wireless networks, the design of communication hardware becomes more demanding, especially considering that wireless data transfer increases exponentially each year. Whether communicating from Mars or simply trying to find an open frequency band to use on Earth, the antenna represents a major bottleneck that limits the advanced functionalities a system can provide. This places antenna research as a major focus area for next generation wireless systems. The first part of this talk focuses on several game-changing antenna concepts that support the grand vision of many exciting space applications. Mars Rovers, for example, have recently garnered significant attention for scientific discovery and exploration. In a recent collaboration between UCLA and the Jet Propulsion Laboratory (JPL), we conceptualized and developed an enhanced high-gain antenna that would improve Direct-to-Earth communications for future Mars Rovers. Another promising technology is the CubeSat concept, where small satellites are launched as secondary payloads from large satellite missions. While CubeSats were originally developed to provide more access to space for the university setting, the low-cost, standardization, and rapid deployment timeframe has led to a dramatic surge in CubeSat R&D for both commercial and defense sectors. I will describe my recent contributions towards realizing a mmWave high-gain antenna system for CubeSats, which could enable future scientific or even commercial ventures. In the second part of this talk, I discuss the concept of software-defined and cognitive radios and their unique requirements placed on the RF and antenna system. For such adaptive radios, reconfigurability at the RF and antenna level has become a necessity. Moreover, novel reconfiguration functions at these stages can also ease the requirements of other subsystems. Several reconfigurable antenna concepts were developed at UCLA with this framework in mind. I conclude this talk with my vision for future concepts that would open new doors for wireless connectivity.



Joshua Kovitz is currently a postdoctoral scholar at the University of California Los Angeles (UCLA). He received his Ph.D. in Electrical Engineering from UCLA in 2015, and his MSEE from UCLA in 2012. He completed a BSEE degree (summa cum laude) from the University of Houston in 2010. Currently, his postdoctoral research at UCLA focuses on mmWave antenna design for CubeSats in addition to cognitive radio and circularly-polarized antennas. During his Masters and PhD, he conducted research under Prof. Yahya Rahmat-Samii in the areas of reconfigurable antennas, applied electromagnetics, nature-inspired optimization techniques, antenna arrays, and wireless communications. He was awarded the National Defense Science and Engineering Graduate (NDSEG) Fellowship and also the Edward K. Rice Outstanding Masters Student Award in 2012. In 2015, he won 2nd place in a competitive Student Paper Contest at the 2015 IEEE Antennas and Propagation Conference. Recently, he was selected as the sole recipient of the prestigious Raj Mittra Travel Grant to attend the 2016 IEEE Antennas and Propagation conference in Puerto Rico, where he was recognized for his "potential or demonstrated aptitude for research".

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