

**THE DEPARTMENT OF ELECTRICAL ENGINEERING & COMPUTER SCIENCE, ECE DIVISION,  
ALONG WITH IEEE MTT/AP ORLANDO CHAPTER  
Present the Fall 2013 EECS Seminar Series**



**Dr. Raj Mitra**  
**Penn State University**  
**“New Challenges in Electromagnetic Communication: Antenna Design,  
High-speed Data Transfer and Energy Harvesting”**  
**Friday, September 27, 2013 • 10:00 a.m. • HEC 101**

Ever since ET, we have been intrigued with the prospect of communicating with life in other planets. Of course, in order for that to happen, we have to find these creatures first, or they have to locate us. Despite a worldwide network of enthusiasts who communicate via social networks and compare notes on UFO sightings and such, we have not really had success in locating such life to date, and the search for life in other planets and distant galaxies continue unabated.

A few years ago, this effort received international recognition, and substantial funding from a consortium of 20 nations, and the SKA (Square Kilometer Array) organization was founded. Just as the name implies, the people involved in this unique radio astronomy project are building array antennas that span over squares of kilometers giving them the sensitivity to receive signals which originated billions of light years back, starting all the way from the “big bang.” In this talk we will take a sneak peek at the status of the SKA, and see how this project is progressing around the world, especially in the two countries that are leaders in the field, namely Australia and the Netherlands,

Of course we need to communicate not only in outer space but also down on earth. We begin by observing the fact that today's children are growing up in the world of video games, twitter, Facebook and such. An intriguing idea--that is not as far-fetched as one might think--is to communicate to the PlayStation on the computer, not in the usual way by manipulating the controller with our hands, but by using brain waves instead. Given this background, the talk will take a quick look at what is happening in this challenging world of communication with machines-- but not in the old-fashioned way like your parents did.

Finally, as we well know, the world of communication today is exploding in more new directions that we ever even imagined a few years ago, when we were only communicating the “usual” ways. But now the scope of communication is growing rapidly, and new applications such as sensing and relaying of information in the context of healthcare and patient monitoring are coming into vogue. The talk will present some examples of new concepts in RF and Optical Communication, including those that might have a substantial impact on the exciting world of cyber communication systems of the future.

## **BIOGRAPHY**

Raj Mitra is a Professor in the Electrical Engineering department of the Pennsylvania State University, where he is the Director of the Electromagnetic Communication Laboratory. Prior to joining Penn State he was a Professor in the Electrical and Computer Engineering at the University of Illinois in Urbana Champaign from 1957 through 1996, when he moved to his present position at the Penn State University. He is a Life Fellow of the IEEE, a Past-President of AP-S, and he has served as the Editor of the Transactions of the Antennas and Propagation Society. He won the Guggenheim Fellowship Award in 1965, the IEEE Centennial Medal in 1984, and the IEEE Millennium medal in 2000. Other honors include the IEEE/AP-S Distinguished Achievement Award in 2002, the Chen-To Tai Education Award in 2004 and the IEEE Electromagnetics Award in 2006, and the IEEE James H. Mulligan Award in 2011. He has been a Visiting Professor at Oxford University, Oxford, England and at the Technical University of Denmark, Lyngby, Denmark. He was recently appointed a Distinguished Professor (Adjunct) at the Yun Tze University in Taiwan, and also at Harbin Engineering University in China. He has also held the position of Highly-cited professor at the King Fahd University of Petroleum and Minerals (KFUPM) in Saudi Arabia.

He has published over 1000 technical papers and more than 30 books or book chapters on various topics related to Electromagnetics, Antennas, Microwaves and Electronic Packaging. He has advised more than 120 Ph.D. and an equal number of M.S. thesis students over the years, and has mentored more than 60 postdocs.. Further information may be found at the website: <http://www.personal.psu.edu/rxm53/>.

Mitra is a Principal Scientist and President of RM Associates, a consulting company founded in 1980, which provides services to industrial and governmental organizations, both in the U.S. and abroad.

A partial list of Mitra's recent publications may be found via Google Scholar Search.