Antennas for RF Energy Harvesting Applications: Design, Development, and Challenges

Overview

Energy harvesting, also known as energy scavenging, is a method that converts surrounding ambient electromagnetic (EM) waves into electrical energy. RF energy harvesting system is demanding research area of interest in recent times. An RF energy harvester consists of a receiving antenna, matching, and rectifying circuits. Receiving antenna converts the input EM waves into AC voltage and current. A rectifying circuit converts the EM waves into a DC power. The antenna in RF energy harvesting systmes are instigated in the receiver side for receiving EM waves from the various ambient RF sources, which are broadly available in the surrounding like digital TV broadcasting (500-MHz band), mobile phone services (UHF-band down link), and several other wireless systems. Research on RF energy harvesting is going on in several areas such as low power wireless sensors, RFID (radio frequency identification) tags, and biotelemetry.

With the advances and popularity of wireless communication devices, large amount of abundant RF energy from surrounding sources are scattered in our environment. Using an appropriate antenna, these EM waves can be converted into electrical energy. Linearly polarized antenna receives only noise signals when the receiving antenna is not aligned with the transmitting antenna. The ambient EM waves exist in all sorts of orientation and polarization, thus high performace circularly polarized antennas are preferred for RF energy harvesting applications. A circularly polarized antenna is insensitive to the multi-path effects and is able to harness RF energy regardless of the device's orientation. For energy harvesting systems, a circularly polarized antenna connected to rectifier circuit is expected to convert RF to dc power which is independent of source polarization.

Course information	Duration: **13-17 November 2017** Place: **Department of ECE, NIT Silchar, Assam, India** Total Contact Hours: **12 hrs. in 5 days**
Course contents	Different type of antenna and rectenna structures will be discussed in details in this proposal for RF energy harvesting applications. An overview of the antennas for RF energy harvesting will be covered and the specifications for these antennas such as low profile, light weight, compact size, polarization multiband, planar structure characteristics, some challenges in antenna designing, are also discussed.
You should attend if	• you are students (B.Tech./M.Tech./ MSc./Ph.D.), researchers and faculty members in all areas of engineering working on RF Energy Harvesting, Microwave, Antennas and allied domains. • you are practicing engineers working on RF Energy Harvesting, Microwave, Antennas and allied domains. • you are engineers/scientists from industries working in all areas of engineering including R&D laboratories.
Registration fee	• Participants from abroad: USD 500 • Industry/ Research Organizations: Rs. 10000/- • Academic Institutions ➢ Faculty: Rs. 5000/- ➢ External Students: Rs. 1000/- ➢ Internal PG & PhD Students: Rs. 500/- ➢ Internal UG Students: Nil **Note:** • The above fee includes all instructional materials, computer use for tutorials, 24 hr. free internet facility. The participants will be provided with single bedded shared **accommodation on payment basis**. • Valid Identity card/bonafide letter is mandatory from the students

The Faculty

Dr. Nasimuddin is a scientist at the Institute for Infocomm Research (I2R), Agency for Science, Technology and Research Singapore. He received his Bachelor Degree in 1994 from Jamia Millia Islamia, New Delhi, India, and Master Degree (Microwave Electronics) and Ph.D. degree in 1998 and 2004, respectively, from the University of Delhi, India. He has worked as a Senior Research Fellow (1999-2003) in DST sponsored project on "Optical Control of Passive Microwave Devices" and Council of Scientific and Industrial Research (CSIR), Government of India, senior research fellowship in Engineering Science for the project entitled "Investigations of microstrip antennas as a sensor for determination of complex dielectric constant of materials" at Department of Electronic Science, University of Delhi, India. He has worked as an Australian Postdoctoral Research Fellow (2004-2006) in awarded Discovery project grant from Australian Research Council for project entitled "Microwave sensor based on multilayered microstrip patch/line resonators" at the Macquarie University, Australia. He has published 142 journal and conference technical papers on microstrip-based microwave antennas and components. He has edited and contributed a chapter to a book "Microstrip antennas" published in 2011 by InTech. His research interests include multilayered microstrip-based structures, millimeter-wave antennas, radio-frequency identification reader antennas, Global Positioning System/Global Navigation Satellite System, ultra-wideband antennas, metamaterials-based microstrip antennas, satellite antennas, RF energy harvesting systems, circularly polarized microstrip antennas, and small antennas for TV white space communications.

He is a Senior Member of the IEEE and the IEEE Antennas and Propagation Society. He was awarded a senior research fellowship from the Council of Scientific and Industrial Research, Government of India in Engineering Science (2001-2003); a Discovery Projects fellowship from the Australian Research Council (2004-2006); Singapore Manufacturing Federation Award (with project team) in 2014, and the Young Scientist Award from the International Union of Radio Science (URSI) in 2005.

Course Co-ordinator

Dr. Taimoor Khan is working as Assistant Professor in Department of Electronics and Communication Engineering at National Institute of Technology Silchar, Silchar, India. His areas of research include printed antennas, electromagnetic band-gap (EBG) structures, ultra-wideband antennas and dielectric resonator antennas.

Course Co-ordinator

Dr. Taimoor Khan

Department of Electronics and Communication Engineering
National Institute of Technology Silchar
Phone: +91-9411823416/
+91-8135048134
Email: tkhan.giancourse@gmail.com

For details, please click on:
http://www.gian.iitkgp.ac.in
http://www.nits.ac.in/gian/gian.php

For registration, please click on:
http://www.gian.iitkgp.ac.in/GREGN/index