The Department of Electronics, Carleton University and IEEE Ottawa EDS/SSCS/CASS Joint Chapter are inviting all interested IEEE members, entrepreneurs, academics, scientists, industry leaders, engineers, technologists, and students to the Seminar on:

Spatio-Temporal Electromagnetic Wave Engineering for Tomorrow's Radio using Phasers, Metasurfaces and Metamaterials

by
Shulabh Gupta
Ecole Polytechnique de Montreal

DATE: Mon, Nov. 16, 2015.
TIME: 1pm – 2pm.
PLACE: Room ME4124, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, Canada.

Refreshments: will be served.
ADMISSION: Free.

Abstract

Radio-Analog Signal Processing (R-ASP), inspired from ultrafast all-optical signal processing principles, has recently emerged as a new paradigm for monitoring, manipulating and processing radio signals in real time. Compared to conventional Digital Signal Processing (DSP) techniques, R-ASP operates on electromagnetic signals directly in their pristine analog form to achieve complex signal processing operations leading to novel microwave/mm-wave systems. It thus provides an attractive and an alternative approach, specially at high frequencies, to overcome the potential drawbacks of DSP techniques, which include high-cost A/D and D/A conversion, high power consumption, low-speed and high complexity. The heart of a R-ASP system is a Phaser, which is a temporally – and sometimes also spatially – dispersive electromagnetic structure whose group delay is designed so as to exhibit the required (quasiarbitrary) frequency function to perform a desired operation, such as for instance, real-time Fourier transformation. The recently developed spatially dispersive phasers based on exotic metasurfaces and metamaterial structures, manipulate and engineer the spatial wavefronts of broadband electromagnetic signals, in addition to their temporal waveforms, transcending them to an exciting new dimension. These phasers can manipulate electromagnetic waves with an unprecedented flexibility, in both space and time, and thereby enable a myriad of microwave applications in communication, radar, instrumentation and imaging, with superior performance or/and functionality. This talk presents an overview of the R-ASP technology, including dispersion-based processing principles, phasing fundamentals and several key applications. The talk will be concluded with a newly developed concept of a perfect dispersive medium and the future roadmap to combat exciting challenges in developing and inventing tomorrow's radio systems.

Speakers' Bio

Shulabh Gupta completed his Bachelor in Technology (B.Tech) in Electronic Engineering from Indian School of Mines, India, and Master of Science (MS) in Telecommunications from INRS-EMT, Université du Québec, and PhD in Electrical Engineering from École Polytechnique of Montréal, Montréal in 2004, 2006 and 2012, respectively. From Dec 2009 to May 2010, he was a Visiting Research Fellow at the Tokyo Institute of Technology, Japan. After his Ph.D., he joined the University of Colorado at Boulder, USA as a postdoctoral Fellow. He later worked at the University of Hong Kong

from 2012 to 2013, and since 2013, he is a postdoctoral researcher at the École Polytechnique of Montréal. His research interests are in electromagnetics, microwave engineering, metamaterials and metasurfaces, ultrafast signal processing and Fourier optics inspired leaky-wave antennas and systems. He was a recipient of the Young Scientist Award of EMTS, Canada (2007), URSI-GA, USA (2008), and ISAP, South Korea (2011). He was also the recipient of the Best Doctoral Dissertation Award of the École Polytechnique of Montréal (2012), the Prix d'excellence de l'Association des doyens des études supérieures au Québec (ADÉSAQ) Édition (2013) in Québec for his thesis, and the Academic Gold Medal of the Governor General of Canada. He is also recently offered the prestigious 2016 Discovery Early Career Researcher Award (DECRA) from the Australian Research Council (ARC) to conduct research at the Macquarie University, Australia for a period of three years.