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Blind Modulation Classification: A Concept Whose Time Has Come

by

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DATE: **Wednesday March 26, 2008.**

TIME: Refreshments, Registration and Networking: **06:45 p.m.**; Seminar: **07:00 p.m. – 08:30 p.m.**

PLACE: University of Ottawa, School of Information Technology and Engineering (SITE), **Boardroom**, 5th floor, 800 King Edward Avenue, Ottawa, Ontario, Canada, For direction to SITE click here on [the map](#).

Admission: Free. Registration required. To ensure a seat, please register by e-mail contacting: Wahab Almuhtadi at almuhtadi@ieee.org.

Abstract

In a world of rapid growth of commercial wireless services, accommodating the explosive demand for spectrum access, efficiency and reliability becomes increasingly technically challenging. A solution is provided by flexible cognitive and intelligent radios, which sense the environment and respond intelligently, without explicit pre-configuration to define their functions. Furthermore, implementation of advanced information services for military applications in a crowded electromagnetic spectrum is a challenging task for communication engineers. Friendly signals should be securely transmitted and received, whereas hostile signals must be located, identified and jammed. The spectrum of these signals may range from HF to millimeter frequency band and their format can vary from simple narrowband modulations to wideband schemes. Under such conditions, advanced techniques are required for real-time signal intelligence, vital for decisions involving electronic warfare operations. This has created the need for flexible cognitive and intelligent radio systems, which employ advanced signal processing techniques. A major task of such radios is signal identification, which can encompass signal detection, separation, parameter estimation, modulation classification, etc..

Modulation classification is an intermediate step between signal detection and demodulation. This is a challenging task, especially in non-cooperative environments, since in addition to complex channels, there are many unknown parameters, such as symbol timing, and carrier phase and frequency. This talk focuses on techniques to tackle the blind modulation classification problem. The state-of-the-art in this research area is first reviewed. Signal cyclostationarity-based techniques are then introduced. Digital and analog, single- and multi-carrier modulations are considered. Single- and multiple-receive antenna cyclostationarity-based classifiers are presented. The talk concludes by outlining new and challenging problems in the dynamic research field of blind signal identification.

Bio

Octavia A. Dobre received the Diploma of Engineer and Ph. D. degrees in Electrical Engineering from the Polytechnic University of Bucharest, Romania, in 1991 and 2000, respectively. In 2000 she was the recipient of a British Royal Society fellowship at Westminster University, UK. In 2001 she joined the Wireless Information Systems Engineering Laboratory at Stevens Institute of Technology, US, as a Fulbright fellow. Between 2002 and 2005 she was a Research Associate with the Department of Electrical and Computer Engineering, New Jersey Institute of Technology, US, where she collaborated with US Army CECOM. Currently she is an Assistant Professor with the Faculty of Engineering and Applied Science at Memorial University, Canada. She has published over 25 research papers, authored over 10 technical reports, served as a reviewer for several international journals and conferences in the area of signal processing and wireless communications and as a member of the Technical Program and Organizing Committees of a number of IEEE conferences, such as ICC 2005 and CCECE 2009, respectively. She has given several invited talks to academia and industry, including Illinois Institute of Technology and Drexel University, US, and CRC and DRDC, Canada. Her current research interests include blind modulation classification and parameter estimation techniques, cognitive radio, multi-antenna systems, multicarrier modulation techniques, cyclostationarity applications in communications and signal processing, and resource allocation in emerging wireless networks.