“A MIMO Radar Signal Simulator for Over The Horizon Radar”

on Wednesday 9th May 2012
in Room 5.57, Ingkarni Wardli (formally Innova21) Building
Adelaide University
at 5:15pm for a 5:30pm start

Sonia Tomei
University of Pisa

Abstract: Inspired by the success of Multiple Input Multiple Output (MIMO) techniques in communication systems where they offer benefits in multipath fading environments and increase the data throughput, the concept of MIMO radar has been investigated. The key feature of these systems is that each node of the transmitting system emits non-interfering waveforms. This waveform diversity enables a significant improvement in system identification, target detection and parameter estimation performance and an enhancement in flexibility for beampattern design. In the last decades studies showed that MIMO radars are especially suitable for OTH (Over The Horizon) radar architecture since they allow the use of adaptive technique for clutter mitigation on the transmitter site and the introduction of spatial directivity into the radar management support sub-system. These systems are used for long distance communications as they provide a mean to reach ground points beyond the horizon by using frequencies in the HF band that are progressively bent by the ionosphere. Therefore, there are many issues related to the ionosphere as propagation channel, especially related to fluctuations in the electron density. These fluctuations affect the propagation of the wave and change the signal path through the ionosphere. An accurate study about the way the propagation path is affected by the ionospheric fluctuations is needed to identify a suitable array design to satisfy the MIMO system requirements. In the same scenario an understanding of the interferences such as external noise, clutter and co-channel interference that affect the signal is important to identify a suitable set of transmitting waveform that allow the reduction of such disturbances. The implementation of a full HF radar signal simulator which includes ionospheric effects would be a useful tool for understanding the propagation of signal in a MIMO scenario.

Biography: Sonia Tomei received the B.S. and M.S. degrees in Telecommunication Engineering from University of Pisa (Italy) in 2008 and 2010. She has been employed as postgraduate researcher for CNIT (National Inter-University Consortium for Telecommunications of Italy) since 2011. She is currently pursuing the Ph.D degree at University of Pisa (Italy) and University of Adelaide (Australia) under a Cotutelle agreement. Her research interests include radar signal processing, imaging and antenna design.

EVERYONE WELCOME

SPONSORED BY THE WOMEN IN ENGINEERING AFFINITY GROUP