Smart Antenna
EC801A
Contacts: 3L
Credits: 3

MODULE –I:
INTRODUCTION:
Antenna Basics, Phased array antenna, power pattern, beam steering, degree of freedom, adaptive antennas, smart antennas - key benefits of smart antenna technology, wide band smart antennas, Propagation Channels **[4L]**

MODULE –II:
SMART ANTENNAS FOR WIRELESS COMMUNICATIONS:
Spatial Processing for Wireless Systems, Key Benefits of Smart Antenna Technology, The Vector Channel Impulse Response and the Spatial Signature, Spatial Processing Receivers, Fixed Beam forming Networks, Switched Beam Systems, Adaptive Antenna Systems, Wideband Smart Antennas, Diversity Techniques, Multiple Input - Multiple Output (MIMO) Communications Systems, MIMO for frequency selective scenarios.   **[10L]**

MODULE –III:
ADAPTIVE PROCESSING:
Sample matrix inversion algorithm, unconstrained LMS algorithm, normalized LMS algorithm, Constrained LMS algorithm, Perturbation algorithms, Neural network approach, Adaptive beam space processing, Implementation issues.   **[8L]**

MODULE –IV:
DIRECTION OF ARRIVAL ESTIMATION (DOA) METHODS:
Spectral estimation methods, linear prediction method, Maximum entropy method, Maximum likelihood method, Eigen structure methods, MUSIC algorithm – root music and cyclic music algorithm, the ESPRIT algorithm.   **[8L]**

MODULE –V:
IMPLEMENTATION OF SMART ANTENNA SYSTEM:
DOA based beam former design using simulation and hardware. Adaptive beam forming implementation using Altera Stratix® series FPGA, QRD RLS Algorithm. CORDIC algorithm.   **[6L]**

TEXT BOOKS:
1. Smart Antenna for Wireless Communication , T.S.Rappaport and J.C.Liberti, Prentice Hall, 1999
2. Smart Antennas, L.C.Godra, CRC Press, 2004
3. Adaptive Filter Theory, S. Haykin. Prentice Hall, 1985
4. Introduction to Smart Antennas, C.A.Balanis, Morgan and Claypool, 2007