

DELEN Doctorate Researchers Seminars

April 16th, 2007 Sala Riunioni Grande DELEN (Ground Floor, facing room 12)

Schedule

- 9:30-10:30 Daniele Milanesio and Luca Necchi
- 10:30-11:00 Coffee Break
- 11:00-12:00 Sara Salvador and Vishal Shah

Abstracts

Daniele Milanesio

ICRH ANTENNAS

Ion-Cyclotron Resonance Heating (ICRH) is a key part of all present-day experiments toward the realization of controlled nuclear fusion with magnetic confinement. ICRH antennas are complex plasma facing components, charged with the difficult mission of delivering extremely high RF powers to the plasma with typically poor loadings. Because of the impossibility of testing antennas in plasmas outside the actual experiments for which they have to be designed, availability of accurate antenna simulation tools is a key factor in assisting the design of presently needed ICRH antennas. The PFA (Plasma Facing Antennas) Group of the department of Electronics of Politecnico di Torino has developed an innovative code, TOPICA (TORino Polytechnic Ion Cyclotron Antenna code), allowing the simulation of the actual geometry of ICRH antennas, correctly accounting for the plasma conditions around the antenna.

Luca Necchi

RETI DI SENSORI WIRELESS

Una "Rete di sensori Wireless" è una rete formata da piccoli dispositivi autonomi che cooperano nell'esecuzione di un'applicazione di raccolta informazioni dall'ambiente circostante, e talvolta di attuazione di funzioni di controllo.

Il problema del risparmio delle poche risorse disponibili diventa quindi l'obiettivo su cui maggiormente concentrare gli sforzi di progettazione. In questo lavoro si descrive l'implementazione di un tipico microcontrollore per Reti di sensori Wireless con tecniche asincrone. Il circuito risultante offre una migliore efficienza energetica, in quanto supporta "Dynamic Voltage and frequency Scaling" fino a valori di tensione di alimentazione del circuito prossimi a quelli della tensione di soglia della tecnologia in uso.

Sara Salvador

MICROWAVE IMAGING FOR BREAST CANCER DETECTION

Microwave imaging has grown in recent years as a very promising technique for breast cancer detection, based on the high contrast in dielectric properties between healthy and malignant mammary tissues. On the footprints of what has been published by Hagness & al, we are developing an imaging system which, by illuminating the breast with suitable wideband signals, collects the reflected signals and, by processing them with a particular algorithm, locate any scattering element (i.e. tumor) inside the breast.

Motivations and basic principles of our work will be exposed and some results obtained with numerical models will be presented. The system performance was originally studied for two-dimensional simple models; more recently we developed more realistic 3D models, comprehensive not only of the breast structure, but also of the wideband antenna, whose project was one of the central features of our work.

Vishal Shah

SYNTESIS OF COARSE GRAIN DELAY INTENSIVE DATAPATH CIRCUITS

We show a method to synthesize coarse grain dual-rail datapath circuits, and how they can be integrated in traditional digital design flow. The domain of application is Digital Integrated Circuits.

Motivations: shrinking geometries and increasing complexity of on chip digital logic components and their sheer number entails many issues, eg. robustness against process variation, clock distribution, that till now were either ignored, or avoided by operating under worst case margins. Looking at alternative circuit design styles, like asynchronous circuits is one way of dealing with the problems of traditional synchronous circuits. This work tries to get a practical realization of such clockless circuits. The foreseen advantages are:

- 1) low power of operation
- 2) reduced concentrated Electro-magnetic emissions
- 3) better tolerance against process variations.