Proposal for stage/internship 2013-2014

« Exploitation of harmonics signals generated by the RFID chip»

Radio Frequency identification (RFID) is a wireless data-collection technology that is becoming very popular in many domains. In the passive UHF RFID system, together with wireless communication, the powerless behavior is another of its key features. However, this technology is still in development and its potential is as yet little exploited. An axis not yet studied is the exploitation of harmonics generated by the chip, although the current trend is opposite and tends to limit their presence.

In this project we propose to exploit the information contained in the harmonics to improve the performance of RFID links, or even consider new applications. Studies on this specific topic are being conducting by the ORSYS group and the first results have confirmed the validity of this idea.

On this context, the work has three main steps:

1) Simulation

Study and design of a new RFID tag optimized to use the harmonic frequencies simultaneously. The so-called "harmonic RFID tag" will have a specific purpose improving the communication reader-tag. The basic tag antenna structure is already defined in order to accomplish a specific FUNCTION that uses both frequencies (fundamental and harmonic). The challenge is to match the RFID chip impedance in two different frequency bands without lumped elements and always assuring the FUNCTIONALITY. Different materials will be studied.

***Simulation and design will be on specialized electromagnetic CAD software as Ansoft Designer or CST Microwave Studio.

2) Prototyping – Measurements

Fabrication of the prototype and validation of its performance by measuring antenna parameters and the whole RFID tag parameters in the laboratory and in real sceneries with a specific purpose reader. Several trials will be envisaged in different materials (FR4 and/or PET) and techniques (Photoresist, Inkjet Printing)

3) Documentation

An internal report should be redacted. The content will be defined at the beginning of the internship and it will be serve as a planning guide for the work. The content of the report should carrier useful comments, figures and conclusions about the results and the work in general; all these will allow the submission of a scientific paper in a specialized journal or conference on the topic before the end of the internship.

Project context: The work is part of the SPINNAKER Project managed by the company TAGSYS RFID. It is developed in a collaborative industrial partnership with other companies and laboratories in France.

- Co-supervisor: Prof. Smail Tedjini (LCIS), Gianfranco Andia Vera (PhD LCIS) and Prof. Yvan Duroc (Univ. C. Bernard Lyon I)

Desired profile
Student of Master in the field of RF systems with good knowledge in antennas, electromagnetic CAD tools, radio-frequency and telecommunications.