

Affaire suivie par

Pr. Smail Tedjini
Tél +33 (0)4 7575 9420
Mob +33 (0)6 3049 8701
Smail.tedjini@grenoble-inp.fr

Ph.D. Open Position **Candidate profile: M.Sc, Engineer in RF, Microwave**

DEVELOPMENT RFID SENSOR TAGS FOR FOOD PRODUCT

In the food sector, RFID technology allows the improvement of the security of food products as well as a better traceability and tracking. The objective of this thesis is the development of UHF RFID tag sensors compliant with food products constraints. The tags should ensure two fold functions, namely: a traceability function with unique ID and a sensing function dealing with the level of maturity of the product. The maturity level is correlated to an indirect measurement of electromagnetic properties of the food product.

The thesis work will concern the study of RFID tags, mainly by an appropriate design of tag antennas taking into account the electromagnetic properties of the support and tag substrate. In radiofrequency domain, it is mainly the substrate that determines the electromagnetic behavior of components, in particular antenna sizes and radiation patterns. The knowledge of these properties is essential to meet the industrial constraints and integrate the developed devices in their applicative environment. In this context, the characterization of the electromagnetic properties of food products is an essential and necessary step for this topic. Then it follows the design and experimental validation of UHF RFID passive tags for traceability purposes. The electromagnetic simulators HFSS and CST available at the LCIS will be used to perform the tag design. In a second step, the tags will be modified in order to transform them into maturity sensors while maintaining the traceability functionality.

The major steps for the thesis:

- Selection of food products
- Measurement of electromagnetic properties of selected materials in order to build a database
- Selection of RFID chips that meet the constraints of food products.
- Design and Validation of UHF RFID tags compliant with food products.
- Transformation of tags into sensors
- Processing of signals delivered by tag sensors and calibration.
- Integration of sensing capability into the RFID reader

Framework: This work will be done within a collaborative project « FUI » in close connection with industrial and public partners.

Location: Mainly in the LCIS Lab. at Valence City France. Some travels to partner locations are necessary.

Facilities: Design tools and measurement systems to conduct the project are available at the LCIS. Some additional facilities are necessary and will be acquired during the project. The realization of tags and sensors will be sub-contracted.

Encadrement et contacts :

Directeur de thèse : Prof. Smail TEDJINI (04 7575 9420, smail.tedjini@grenoble-inp.fr)
Co-encadrante : Dr. Darine KADDOUR (04 7575 9478, darine.kaddour@grenoble-inp.fr)