

## **Design of Millimeter wave sensor prototypes For Monitoring food processes**

Duration: starting data: 01/10/2011

Period: 4 years

Context:

A multi-team project has been granted by IWT, focusing on state-of-the-art sensors for the food industry. This project will be executed in collaboration with Flanders' Food, K.U.Leuven, Imec, VUB and IBBT and will be supported by 70 companies, direct active in the food industry or (instrumentation) suppliers to the food industry.

The ETRO department of VUB has a pioneering role in the exploitation of sensor applications of **millimeter waves** in various fields (food, pharma, NDT industry,...). Besides the state-of-the-art fundamental research also several industrially oriented projects have already been executed. The proposed research will be executed with various colleagues at the ETRO-VUB department, but also with colleagues at ibbt and imec.

Project Goal:

Delivering and testing various mm wave sensor prototypes in various companies, exploiting the unique interaction properties of millimeter waves with food products.

Specific tasks:

- \* Dielectric response of selected food material mixtures
  - Quantification of the dielectric functions of compound materials comprising water and performing a sensitivity analysis of the compositional and temperature variations
  - Experimental validation of these models by S-parameter measurements with a multi-GHz quasi-optical vector network analyzer
  
- \* Sensor configuration
  - Determining the relationship between the sensor configuration and illumination parameters, including beam forming and the sensitivity of the sensor
  - Designing mm wave sensor configurations, including PCB design with microwave CAD-tools allowing a multi-component illumination (frequency, angle, polarization...) of the materials under test
  - Selecting suitable components, assembling and testing the sensor configurations
  
- \* Develop computer controlled sensor systems for multi-sensor data acquisition and processing
  
- \* Test the prototype sensors at and in the process lines of various companies

**Applicant required experience and skills:**

A master awarded in electrical engineering, with specialization in HF-electronics. Good knowledge of dielectric functions. Experience in computer controlled systems: automated data acquisition and data processing.

Minimum knowledge of languages: Fluent English; Dutch is an advantage to interact with people in local companies.

Driving license B.

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