

Context

Since the late 1990s, wireless sensor networks emerge as a key technology for numerous applications (domestic, health, environmental, industrial, military, ...) and especially for SHM (Structural Health Monitoring).

In the 2000's a new class of wireless sensor with electromagnetic transducers appeared, combining RF-MEMS technologies and wireless sensors and using electromagnetic transducers. These transducers are mainly composed of a variable RF impedance or RF resonator connected to an antenna that can be interrogated through backscattered wave analysis. Several concepts are possible to realize a sensor with this kind of device by changing the size, the RF properties of a material constituting the devices and the coupling between different parts of the devices (using displacement of a fluid or mechanical part). The main advantages of these types of wireless chipless passive sensors are : 1) the full energy autonomy (no consumption and no battery), 2) the long range (several ten of meters) interrogation distance compare to other kind of passive sensors (like Surface Acoustic Wave or classical RFID sensors), 3) the high miniaturization (using mm-wave frequency : 24GHz and 79GHz), 4) the compatibility with harsh environments (no active electronic circuits, no battery), 5) the large range of physical and chemical applications.

CNRS-LAAS (MINC team) was among the first laboratories in the world to investigate this new kind of sensors. This laboratory has already validated several original concepts (working around 24GHz) for pressure, temperature, stress and nuclear radiation transducers [1-2] but also Frequency-Modulated Continuous-Wave radar for the wireless localization, identification and reading of these transducers [3-4].

Several funded projects started in 2015 in collaboration with industrial partners and we are looking for a research engineers (or post doctoral position) for 12 to 24 months. Two engineers are today involved in these projects mainly for material and technological aspects. We are now looking for an engineer with RF competences for design and characterization. Depending on the candidate background it will be also possible to be involved in cleanroom for technological process.

The position offer is open from 1st April 2017 and the starting is for 1st of May 2017 or 1st of June if possible.

- [1] P. Pons, H. Aubert, M. Tentzeris, "*Overview of Electromagnetic Transducers with Radar Interrogation for Passive Wireless Sensors Applications*", International Conference on Microwaves, Radar and Wireless Communications (MIKON), June 16-18 2014, Gdansk, Poland
- [2] E Debourg, A Rifai, H. Aubert, I. Augustyniak, P. Knapkiewicz, J. Dziuban, M. Matusiak, M.Olszacki, P.Pons, "*High doses wireless radiation sensor using electromagnetic transducers*", European Microwave Week, 6-11 Sept 2015, Paris
- [3] H. Aubert, F. Chebila, M. Jatlaoui, T. Thai, H. Hallil, A. Traille, S. Bouaziz, A. Rifai, P. Pons, P. Menini, M. Tentzeris, "*Wireless Sensing and Identification based on RADAR Cross Sections Variability Measurement of Passive Electromagnetic Sensors*", Annals of telecommunications, vol. 68, no7-8, Aug 2013, pp. 425-435
- [4] D Henry, P Pons, H Aubert, "*3D Scanning Radar for the Remote Reading of Passive Electromagnetic Sensors*", International Microwave Symposium (IMS), 17-22 May 2015, Phoenix, USA

Job profile

- RF conception of transducers using electromagnetic software (HFSS, ADS)
- RF characterization of transducers using on probe S parameter measurements
- Radar measurements of transducers

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