Post-doc position

MmW Antenna in Package Designer

**Team (s):** Microwave Imaging and Antenna Systems (ISA)

**Keywords:** Antenna Design, mmW, antenna array, system in package

**Supervisor (s):** Jérôme Lanteri (associated professor)

**Training place:** LEAT
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**Context**

This position is opened in the framework of ODESSA project awarded inside Cleansky2 program funded by the European commission. Mid-air, near mid-air, and on ground collisions are one of the most important cause of accident in general aviation. For this reason, engineering an affordable sensor helping pilots in preventing it could be very important in order to prevent accidents. Present sensors, indeed, are very expensive and cannot be affordable for small aircraft and helicopters. The idea of ODESSA (Obstruction DEtection Sensor for Surveillance on Aircraft) is to provide a small, light, and low-cost sensor (comparing it to the present ones) that could be installed on civil airplanes and helicopters. This is possible adopting the modular avionics concepts of on-board system independency, reducing maintenance efforts, granting different platform applicability. Using millimetric radar, learning techniques from automotive worlds, gives different advantages. One is that automotive technologies are well tested and reliable. These solutions are small, light and cheap too. Inheriting characteristics from automotive technologies, ODESSA allows to detect small object, increasing on-ground safety during handling and taxing. An issue of these mission phases is the possibility of collision not only with aircraft (that could be minimized by using new generation ADS-B systems), but with other kinds of object (as pushbacks, cars, signals, personnel, birds…) not well detectable from aircraft unless mounting the terrestrial version of ADS-B (that requests the adaptation of the whole airport infrastructure). ODESSA system makes possible that safety in landing and ground procedures is independent from different component of the airport system, granting danger acknowledgment in different sceneries.

**Summary of the research proposal**

In this research proposal, the main activity will be focused on In-package approach with issues related to antenna conception in PCB technology at mmw and the co-design with the frontend of the radar architecture. Thereby, more degrees of freedom for optimize the antenna’s performance in terms of the application (long range or short-range radar, spatial resolution) are available. You will take in charge the following activities:

- The first step will be to optimize the lattice of TX and RX antenna array to adapt the MIMO performance in terms of the radar application addressed in the project.
- The second step is to work on the feeding network of the antenna array to reduce losses which can be high in W band when antennas and feeding are fabricated on a substrate.
- The third one is to redesign the elementary antenna to obtain more directive antenna for long range radar application. Considering we will use a technology different from the one of the mm-wave Front-end, on can also consider using other technology than microstrip antenna (for example small horn antennas fabricated with 3D or electro-erosion technologies).

**Salary:** Approximately between 1900€ and 2400€, depending on the experience

**Starting date:** April 2019

**Duration:** 12 months

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