Name: **Roman LEDUC**
Email: roman.leduc@univ-pau.fr

Supervisors: Robert RUSCASSIÉ, Jean-Marc DIENOT
Partners/Funding: E2S, CEA

Status: PhD started on September 2019

Development of a high frequency data conversion system working under electromagnetically disturbed environment

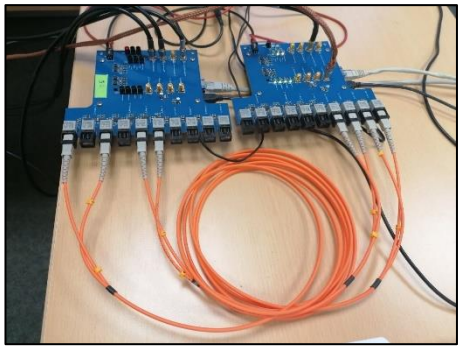
Abstract

Nowadays, it has been noticed that a request is made from users of isolated and unaccessible power electronic systems to be able to supervise their evolution and aging by periodically collecting numerous data. The idea has emerged with FPGA-SoC technology to develop suitable device for user's application, gathering performances of multiple devices into a single one, such as high frequency ADC (250MS/s) working under EM stressed environment, plus wireless & crypted communication with user through private data visualisation/managing server. Also, as necessitates the environment, extended energy autonomy is required.

On the other hand, as this system requires strong EM shielding, a study on multilayer shielding screens is being carried through numerical analysis (CST MW) and results will be compared with experimental validation.

On-going work

A project in collaboration with CEA Cesta consisted in the development of a security system based on FPGA-SoC technology for EPURE radiography equi pement. This was a good opportunity to validate the interest in this technology especially for managing multiple high frequency signals in parallel from one hand, and supervising a whole system through local network on the other hand.



The objectives are now to develop the same FPGA based system with our own analogic to digital conversion interface opening to a broad range of applications, with embedded system features such as long distance transmission through optical fiber and wireless technology. At such frequency parametric analysis were performed on CST MW in order to optimize the signal integrity of our designed PCB.

The results from shielding effectiveness of multilayer screen numerical analysis where conclusive regarding different parameters (number of layers, spacing, symmetrical divisions…) compared to single layer screens, since a shielding effectiveness improvement up to 40dB could be estimated, motivating for setting up the experimental validations.