Modelling, Design and Characterization of Energy-Data Hybrid Transition Device

Keywords – Data and Energy intelligent harvesting, digital communication, rectenna, HF circuit, behavioural modelling, prototyping, test bench

Institutions – The PhD student will be hired for 3 years at Energy Lab (University of La Reunion). The work will be performed together with the well-known NUIST laboratory, Nanjing, China. The PhD student will work with Assoc. Prof. Nour Murad (Energy Lab) and Prof. Blaise Ravelo (NUIST).

Scientific goals and activity – The purpose of this thesis is to develop a completely innovative electronic device for simultaneously collecting Data and ambient electromagnetic Energy (D-E). Modeling approaches of an optimized D-E topology will be initiated and established based on the Tensorial Network Analysis (ATR) formalism. The tensorial model will be used to identify the best type of circuit and available technologies. Based on wireless communication scenarios with wireless nanogrid nodes (IoT), first analytical studies will be developed followed by co-simulations using EM 3-D modeling tools (CST®, HFSS®, Feko®), circuit and system simulations (ADS®) and digital devices such as microcontrollers or ASICs. The feasibility of the D-E model will be validated with prototypes acting with Wireless Sensor Networks (WSN) and nodes in an environment of 3G / 4G / 5G communication environments. Test benches will be developed at the University of La Réunion to meet the needs of local partner companies in technology transfer, but also to new training offers in the future digital energy professions.

The master or engineer student can potentially pursue the present research work as an international PhD student for 3 years at the EnergyLab in Réunion Island with possibility to travel in China to work in collaboration with Nanjing University of Information Science and Technology (NUIST).

Host laboratory
- Energy lab from University of la Reunion
- NUIST lab from Nanjing, China

Candidate requirements – The m/f candidate must be from engineering school or Master graduate in Applied Mathematics, Computer Sciences, Hyper Frequency Systems or any domain related to the position. He/She must be proficient on antenna design, HF circuit with ADS®, HFSS®, CST® and equivalent, also in python and Matlab programming. Also, a good applied mathematical knowledge on tensorial analysis and signal processing are welcomed. The candidate must have a good knowledge of English and French

Application documents to be provided – To candidate, please be sure to include the following elements: (i) A complete CV, (ii) a motivation letter, (iii) at least two recommendation letters, (iv) the last three-year degrees and scores. The candidate will be selected with full application documents and after interview. Asian, Indian and South Africa candidate are welcomed.

Deadline – As soon as possible, until June 1st. Forecasted beginning of the project at November 2020.

Contact – Please send your application to these two mails with object: "Thesis in [Energy-Data Hybrid]
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