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# Self-adaptive circuits for vibration energy harvesting: from concepts to ASIC design


## Associate Professor Adrien Morel

Laboratory of Systems and Materials for Mechatronics
at the Université Savoie Mont Blanc, Annecy, France


**Date: Thursday, April 20, 2023 15:00-16:00**
**Venue: Faculty of Engineering Bldg. 2, Room 31B**


**Abstract:**
Energy harvesting is an emerging field whose primary objective is to develop autonomous, batteryless sensors that do not require maintenance. Scavenging energy from ambient vibrations is particularly relevant in closed, confined environments where solar energy and thermal gradients are not sufficiently abundant. In most real environments, the vibration spectrum can vary over time. Combined with the narrow frequency bandwidth of linear oscillators, this leads to poor harvesting performance and weakly robust vibration energy harvesting solutions. This constitutes one of the main challenges faced by vibration energy harvesting technology, which hinders its industrialization and commercialization.
In this seminar, a solution to this challenge, based on adaptive electrical circuits and strongly coupled oscillators, will be presented and discussed. The seminar will delve into the theoretical foundations behind this approach, and explore the influences of various electrical circuits on the dynamics of the harvester. Furthermore, the implementation of this solution, from system-level design to self-powered self-adaptive ASIC, will be presented. The benefits and limitations of this approach will also be highlighted, along with an overview of current research trends in this field.


**Short Biography:**
Adrien Morel received his electrical engineering degree from INSA Lyon. From 2016, he pursued his Ph.D. at CEA in Grenoble, France, focusing on vibration energy harvesting. From 2019 to 2021, he worked as a research engineer at CEA-LETI, where he focused on electronic interfaces for quantum computing. He currently serves as an associate professor at the Université Savoie Mont Blanc, Annecy, France. His research interests include energy harvesting, power management circuits, multiphysics modeling, and nonlinear dynamics.

**Registration**
**https://forms.gle/NXwNnucG6XTMkbnv5**
**Please register by Apr 18.**

主催：
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