USEES5 - Sustainable IoT Technologies

Mis à jour le 06-10-2025

Code : USEES5

Unité spécifique de type cours

3 crédits

Responsabilité nationale : EPN05 - Informatique / Stefano SECCI

Présentation

Prérequis

- Basics of programming. Knowledge of Matlab.
- Basics of Electronics and Circuit Theory.
- Basics of Mathematical Analysis

Objectifs pédagogiques

The main goal of this course is to understand the need of batteryless IoT devices and what are the new challenges of these intermittent systems. Other general aspects of IoT such as low power communication technologies or applications (including sustainable applications) will also be covered.

Programme

Contenu

This Short Term Course will focus on sustainable batteryless IoT devices. In general, IoT devices run on batteries, which are short-lived, harmful to the environment and difficult to replace in hard-to-reach areas. For this reason, batteryless devices get rid of batteries by using energy harvested from the environment and storing it in a small capacitor. However, capacitors have to deal with an intermittency behaviour which results in communication and computing challenges, which will be explained in this course. We will evaluate how different technologies such as Blootooth Low Energy (BLE) or LoRaWAN deal with this new paradigm and what are the new takeaways.

Topics:

- Introduction to IoT
- Sensors, Actuators and Applications
- IoT Communication Technologies
- Batteryless IoT devices
- Circuit modeling
- Energy harvesting possibilities
- Batteryless Communication Challenges
- Batteryless Computing Challenges
- Conclusions

Modalités de validation

- Contrôle continu
- Projet(s)
- Examen final

Description des modalités de validation

- Final exam, short in-class quizzes and lab project report.
- A project assignment to perform after the STC execution will also be evaluated.