

UE Design project 1



Level
Baccalaureate
+5



ECTS
3 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX9SCAD

Presentation

Description

Under Floor Air Distribution for Intelligent Buildings

This new technology presents many advantages in comparison with traditional ventilation systems, such as energy consumption reduction, comfort and health. UFAD efficiency directly depends on distributed sensing capabilities (thanks to the deployment of a wireless sensor network) and on an appropriate multivariable feedback control design. The idea comes then to conceive a prototype in order to validate theoretic and simulation results and to implement control algorithms. The prototype represents a ventilated floor composed of three interconnected levels: under floor, four rooms and upper floor. The related IPA projects are dedicated to air conditioning operation, with an emphasis on the modeling and control of airflow in each level and between the adjacent rooms.

Controlling instability: the inverted half cube

Unstable processes are typically not controllable with open-loop strategies and hence provide valuable benchmarks for feedback control applications. Addressing the stabilization of such processes implies a specific care of the key control design issues, such as performance limitations, communication and computation constraints, robustness, nonlinearities etc.

The inverted half cube, designed and built by IPA students, implies to stabilize the half cube on its lower edge thanks to a cart driven with a LEGO NXT module. This novel version of the classical "inverted pendulum" implies to solve the same control problems as those associated with walking biped robots, a missile propelled by a jet reaction, a load suspended from a crane, etc...

Course parts

TP	Practical work (TP)	23h
Period : Semester 9		

Useful info

Place

➤ Grenoble

Campus

➤ Grenoble - Scientific Polygon