

UE Design project 1



Niveau d'étude
Bac +5



ECTS
3 crédits



Composante
UFR Physique,
Ingénierie,
Terre,
Environnement,
Mécanique
(PhITEM)



Période de
l'année
Automne (sept.
à dec./janv.)

Diplômes intégrant cet élément

- Master Electronique, énergie électrique, automatique

- › Langue(s) d'enseignement: Anglais
- › Ouvert aux étudiants en échange: Oui
- › Code d'export Apogée: PAX9SCAD

Présentation

Description

This **five months project** (in parallel with the theoretical classes) investigates new control designs or automation solutions for **real-time feedback** operation, the minimization of energy consumption in dynamic systems and the analysis and optimization of **complex dynamical systems**.

The feedback can be based on distributed sensing capabilities, networked sensors, physical modeling for the process automation design and data-driven models.

The design project is structured into two parts: from September to December with meetings every other week in *Design Project 1*, and in January with meetings multiple times per week in *Design Project 2*.

Objectifs

Different projects are proposed to small groups of students (from 2 to 4), for example on:

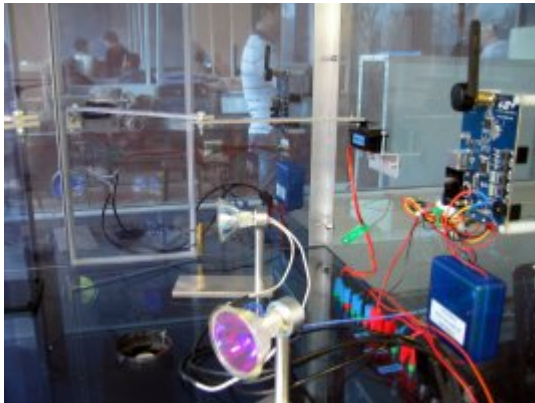
- zone mapping and path optimization with communicating robots;
- heat pump automation for energy savings;
- under floor air distribution (UFAD) for intelligent buildings;
- water distribution design for green building automation;
- robot design and stabilization with embedded control algorithms.

All the projects are structured similarly, as the students are asked to:

- analyze the project objectives and description of work to determine the research schedule, including specific **milestones** with the key technical issues and the titles and overview of **deliverables**;
- perform an exhaustive **bibliographical research** to clearly state the actual available technology and propose some innovative improvements;
- propose different models of the plants, stressing out the key points and necessary assumptions, along with the design of a **real-time simulator**;
- define the **control problem**, in terms of objectives, costs and constraints, and compare different control approaches;
- provide a detailed technical solution for building an **experimental facility** that illustrates the main real-time closed-loop control issues.

Au choix : 2 parmi 4





Example of a long term project: the UFAD experiment. The air is cooled in the lower plenum by Peltier modules and then injected in each room thanks to fans, regulated from temperature measurements by Zigbee modules. Disturbances are generated by the light bulbs (heating effect) and opening/closing of doors. The heated air naturally flows into the upper plenum, where it is driven back in the underfloor.

Heures d'enseignement

TP	TP	23h
Période : Semestre 9		

Infos pratiques

Lieu(x) ville

➤ Grenoble

Campus

➤ Grenoble - Polygone scientifique